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GENERAL INDEX.

| | PAGE. | | PAGE |
|--|-----------------------------|--|-------------------------|
| A. | | Budding Fruit Trees, No Time Like the Present 193 | |
| ABC of Queensland and Australian Statistics..... | 379 | Buffalo Fly..... | 208, 299, 320 |
| Abcessed Ear (Pig)..... | 317 | "Bullock's Heart"..... | 451 |
| Abstracts and Reviews..... | 404 | Bundaberg Experiment Plot..... | 23 |
| Adam Smith, Go Back to..... | 187 | Burr, Chinese..... | 316 |
| Adjusting Plough Draft..... | 237 | Burr Vine..... | 376 |
| Agricultural and Pastoral Prospects..... | 333 | Butter Board, Equalisation System for..... | 255 |
| Agricultural Position in Queensland..... | 121 | Butter-Fat in Separating, Loss of..... | 291 |
| Agriculture in Queensland..... | 7 | Butter-Fat Variation, Cows with Tight Udders..... | 428 |
| Agriculture in the North..... | 249 | | |
| American Redwood..... | 374 | C. | |
| Anzac..... | 358 | Canegrowers' Conference, Minister's Opening Address..... | 267 |
| Apple, Cockatoo..... | 375 | Canegrowers' Defence Club Levy..... | 87 |
| Are we Over Organised?..... | 186 | Canegrowers, Entomological Hints to..... | 202 |
| Arrowroot Flour, Control of..... | 256 | Cane Pest Combat and Control..... | 108, 204, 274, 337 |
| Astronomical Data for Queensland..... | 96, 198, 266, 332, 390, 474 | Cane Pests and Diseases..... | 102, 203, 275, 336, 397 |
| B. | | Cane Prices Act, Benefit of..... | 269 |
| Babies, Our..... | 90, 189, 259, 325, 383, 465 | Cane Prices Boards..... | 182 |
| Baby, Care of the..... | 191 | Cape Gooseberries..... | 194 |
| Bacon Curing on the Farm..... | 377 | Caponising..... | 229 |
| Bacteria and Fungi..... | 339 | Carpet Grass..... | 374 |
| Banana Board Poll..... | 322 | Carriage of Bananas to Railway..... | 88 |
| Banana Board, Proposed..... | 184 | Cassia..... | 375 |
| Banana Experiment Stations..... | 351 | Cattle Bush..... | 314 |
| Banana Grade Standards..... | 98, 164, 199 | Central Queensland Plants Identified..... | 375 |
| Banana Weevil Borer Investigation Com. mittee..... | 183 | Charter of Control..... | 268 |
| Bananas, Marketing of..... | 97 | Chicory..... | 250 |
| Batswing Coral..... | 375 | Chinese Burr..... | 316 |
| Beauties of Nature..... | 192 | Christmas, The Spirit of..... | 26 |
| Beautiful Prayer..... | 87 | Churn and Worker, Care of the..... | 296 |
| Bees, Wintering Conditions for..... | 461 | Citriculture..... | 99 |
| Bendee..... | 314 | Citrus Levy Regulations..... | 322, 458 |
| Birdlime Tree..... | 177 | City-ward Drift..... | 186 |
| Bird of Paradise Flower..... | 175 | Clathus..... | 174 |
| Bitter Bark..... | 251 | <i>Cleome aculeata</i> | 176 |
| Blue Grass..... | 316 | Cockatoo Apple..... | 375 |
| Book Knowledge not Education..... | 185 | Common Weed (<i>Cleome aculeata</i>)..... | 176 |
| Border Restrictions..... | 182, 298 | Control of Arrowroot Flour..... | 256 |
| Bottle Tree..... | 177 | Control of Meat Ants..... | 111 |
| Brains in Industry..... | 186 | Co-operation, Practical..... | 392 |
| Brands, Examination of..... | 320 | Co-operation—Romance of the Rochdale Movement..... | 244 |
| Brands, New Series of Horse and Cattle..... | 241 | Coral, Batswing..... | 375 |
| Breeding Pigs, Size of..... | 235 | Cotton Being Harvested..... | 334 |
| Breeding Sow, Selection of..... | 439 | Cotton Board..... | 87 |
| Broom Millet Board..... | 183, 256 | Cotton Board Election..... | 254 |
| Brown Top..... | 316 | Cotton, Federal Bounties..... | 321 |

GENERAL INDEX.

III.

| | PAGE. |
|---|-------|
| Cotton Industry and the Tariff | 303 |
| Cotton Stalks, Removal of | 421 |
| Couch, Giant | 250 |
| Country Girls' Opportunity | 387 |
| Country School in Queensland | 420 |
| Courage in Excelsis | 188 |
| Cream, Common Defects Causes and Remedies | 380 |
| Crop Prospects for 1929 | 100 |
| Cult of the Colt .. 83, 169, 246, 300, 371. | 433 |
| Curative Plants | 176 |
| "Curled Dock" | 176 |
| Custard Apple Levy | 320 |

D.

| | |
|--|----------|
| Dairy Cattle, Better Pastures for | 464 |
| Dairy Cattle Judging Scale of Points | 313 |
| Dairy Industry Development | 427 |
| Dairy Production, Regulating the | 463 |
| Dairy Utensils, Sterilising | 425 |
| Dairying Economics | 2 |
| Dairying Equalisation, Butter Board | 255 |
| Dairying Industry in Queensland | 287 |
| Dairying—Interstate Butter Trade | 242 |
| Dairying Milk and Cream .. 138, 209, 380 | |
| Dairying—Some Common Causes of Indigestion in Calves | 236 |
| Desert Poison Bush | 314 |
| Diarrhoea in Young Pigs | 234 |
| Dingo, A Few Hints on Poisoning | 323 |
| Dingo, A Few Hints on Trapping the Pest | 171 |
| Dingo Trapping, An Effective Lure | 236 |
| Dipping Lambs, A Southern Trial | 462 |
| Dipping Made Easy | 238 |
| Disease Control | 406 |
| Disturbed Balance | 185 |
| Division of Agriculture and Soils, Future Work | 401 |
| Dodder | 74 |
| Drainage of Irrigated Lands at Theodore | 183 |
| Draught Horse, Ailing | 174 |
| Ducks, Open Season for | 320, 457 |

E.

| | |
|--|---------------|
| Ear, Abscessed (Pig) | 317 |
| Economics of Dairying | 2 |
| Education not Mere Book Knowledge | 185 |
| Egg Board | 185, 255, 322 |
| Egg Board Election | 322 |
| Egg Board Levy | 380 |
| Egg Board Referendum | 320 |
| Entomological Hints to Canegrowers | 100, 202 |
| Equalisation System for Butter Board | 255 |
| Euphorbia <i>Drammondii</i> | 314 |
| Euphorbia <i>prostrata</i> | 314 |
| Examinations under "The Dairy Produce Act of 1920" | 378 |
| Experimental Plots (Sugar) | 398 |

F.

| | |
|--|-----------------------------|
| Farmers' Organisations | 357 |
| Farm Notes | 94, 195, 265, 329, 387, 471 |
| Farm Tractors | 159, 438 |
| Fat Lambs, The Type of Ewe to Breed from | 243 |
| Federal Bounties, The Case for Corton | 321 |
| Fertiliser, Sheep Manure as | 452 |
| Field Reports | 25 |
| Flag Smut of Wheat | 184 |
| Flannel Weed | 452 |
| Flower Garden | 328, 386, 471 |

| | |
|--|-----|
| Flyblown Sheep, How to Treat | 168 |
| Fodders, Winter | 334 |
| Forage Poisoning in Animals | 75 |
| Foundation of Farming, The Cow | 258 |
| French Honour for Departmental Officer | 458 |
| Fruit and Vegetable Levy Regulations, Stanthorpe | 255 |
| Fruit, Grade Standards | 319 |
| Fruitgrowing | 335 |
| Fruitgrowing in Queensland | 163 |
| Fruit Journal | 458 |
| Fruit Trees, Budding | 193 |
| Fruit Trees, Getting Land Ready | 380 |
| Fruit Trees, Points in Planting | 458 |
| Fungi and Bacteria | 339 |
| Fungicides and Disease Control | 406 |
| Fungus | 452 |
| Fungus, Net | 174 |

G.

| | |
|---|----------|
| Galvanised Iron Tank, To Repair | 262 |
| Garden, Flower .. 328, 386, 471 | |
| <i>Gardenia glabosa</i> , "Wedding Bells" | 451 |
| Gardening, Creative | 385 |
| Garden, Kitchen .. 261, 328, 385, 470 | |
| Garden Roses, Twelve Best | 467 |
| Giant Couch | 250 |
| "Glycine Pea" | 251 |
| Good "Handler" | 258 |
| Good Wheat Crop, Promise of | 334 |
| Good Year, It was a | 1 |
| Goose and Duck in Queensland, Open Season for | 320, 459 |
| Grade Standards for Bananas .. 98, 164, 199 | |
| Grade Standards for Fruit | 319 |
| Grade Standards for Oranges and Mandarins | 182 |
| Grape Vine, Native | 375 |
| Grasses Identified | 175, 251 |
| Grass, Blue | 316 |
| Grass, Carpet | 374 |
| Grass, Johnson | 74 |
| Grass, Nut | 176 |
| Grass, Pigeon | 315 |
| Grass, Stink | 315 |
| Grass, Yellow | 316 |
| Graziers' Prospects Bright | 335 |
| Growing Good Lettuce | 261 |

H.

| | |
|--|-----|
| Hairy Indigo | 451 |
| Hawthorn, Henry Cramer | 178 |
| Hedges, Planting and Care of | 193 |
| Home Beautiful | 384 |
| Honey Board | 320 |
| Honey Board Election | 378 |
| Honey Board, Proposed | 185 |
| Honey Locust | 375 |
| Honey Production Returns | 321 |
| Horse, Ailing Draught | 174 |
| Horse and Cattle Brands, New Series of | 241 |
| Horses, Watering | 378 |

I.

| | |
|---|-----|
| Ideals, Talk, but What Action? | 324 |
| India Rubber Vine | 375 |
| Indigestion in Calves, Some Common Causes | 236 |
| Indigo, Hairy | 451 |
| Insect Anatomy | 27 |
| Insecticides | 277 |
| Interstate Butter Trade | 242 |

IV.

GENERAL INDEX.

| | PAGE. |
|---------------------------------|-------|
| J. | |
| Johnson Grass | 74 |
| Journal, A Tribute to the | 256 |

| | |
|--------------------------------|--------------------|
| K. | |
| Kauri, Queensland | 374 |
| Kelpie, His Origin | 187 |
| Kitchen Garden | 261, 323, 386, 470 |
| Kitchen, Why not Elevate | 335 |

| | |
|---|----------|
| L. | |
| Lake Pleasant, A Sanctuary for Animals and Birds | 257 |
| Lambs—A Southern Dipping Trial | 462 |
| Lambs, Fat, The Type of Ewe to Breed from | 243 |
| Land as an Investment | 188 |
| Lawn, Care of | 471 |
| Legumes, Their Importance | 359 |
| Leopard Flower | 374 |
| Lettuce, Growing Good | 261 |
| Levies, Mourilyan, Invieta, and Tully River Central Sugar Mills | 183 |
| Lice in Pigs | 178, 253 |
| Life | 324 |
| Live Stock, British Breeds | 360 |
| Local Sugar Cane Prices Boards | 182 |
| Love-in-a-Mist Passion Vine | 375 |
| Lucerne, Tree | 175 |

| | |
|--|----------|
| M. | |
| Machine on the Farm | 201 |
| Mahogany, Swamp | 451 |
| Maize Ready for Harvesting | 334 |
| Man Must Have a Focus | 323 |
| Mandarins, Grade Standards | 182 |
| Mandarin, Wild | 374 |
| Measuring the Flow | 89 |
| Meat Ants, Control of | 111 |
| Men and Machines | 461 |
| Meteorology to Agriculture, Practical Application of | 77 |
| Milk and Thunderstorms | 188 |
| Milk Flavour Defects | 289 |
| Milking Machines, Use and Care of | 370 |
| Millet Board, Broom | 183, 256 |
| Millet, Wild | 176, 313 |
| Minister at Kilkivan | 457 |
| Mint, Wild | 250 |
| Motor Headlights, Dimming Condemned | 324 |
| Motorists, Points for | 436 |
| Moving to Better Things | 187 |
| Mukia Scabrella | 451 |
| Mulga | 314 |

| | |
|--|-----|
| N. | |
| Nature and Statesmanship | 323 |
| Nature, Beauties of | 192 |
| Net Fungus | 174 |
| New Sanctuaries for Useful Birds and Animals | 322 |
| New Statesmanship | 320 |
| New Year Message, The Minister's | 5 |
| Normal Temperature of Animals | 256 |
| Northern Agriculture | 249 |

| | PAGE. |
|----------------------------------|-------|
| Northern Plants Identified | 261 |
| Nut Grass Eradication | 176 |

| | |
|---|-----------------------------|
| O. | |
| Opossums, Open Season for | 460 |
| Opportunity for Country Girls | 327 |
| Opportunity for Youths | 321 |
| Oranges, Grade Standards | 182 |
| Orchard Cultivation—Economy of Zigzag Tillage | 257 |
| Orchard Notes | 93, 195, 263, 329, 387, 472 |
| Organisation, Farmers' | 357 |
| Osborne, Mr. Wilfred L. | 241 |

| | |
|---|---------------|
| P. | |
| Paralysis of the Hindquarters (Pig) .. | 252 |
| <i>Paspalum conjugatum</i> | 316 |
| Passion Fruit Culture | 305 |
| Passion Vine, Love-in-a-Mist | 375 |
| Pastoral and Agricultural Prospects .. | 333 |
| Pig—Abscessed Ear | 317 |
| Pig Ailments | 453 |
| Pig and Sow, (Champion of Champions ("Brentwood Dorothy")) | 444 |
| Pig Farmers' School of Instruction at Gatton College | 255, 364, 459 |
| Pig Industry Council of Australia Annual Meeting | 362 |
| Pig Raising in Queensland | 123 |
| Pig, Standards | 376 |
| Pig, Weaning the | 365 |
| Pigbreeding in Denmark | 257 |
| Pigeon Grass | 315 |
| Pigs and Sows, Breeding | 235, 439 |
| Pigs at Toowoomba Show, 1929 | 363 |
| Pigs—Cause of Soft Pork | 258 |
| Pigs, Chester White Breed | 310 |
| Pigs, Diarrhoea or White Scour | 234 |
| Pigs, Feeding | 453 |
| Pigs, Overfat | 113 |
| Pigs, Sick | 376 |
| Pigs, Skim Milk for | 316 |
| Pigs, Sunflower Seed for | 377 |
| Pigs, Worms and Lice | 178, 253 |
| Pineapple Levy Regulations Extended .. | 256 |
| Pineapples and Sugar | 393 |
| Planning a Piggery | 252 |
| Planting and Care of Hedges | 193 |
| Plough Draft, Adjusting | 237 |
| Points in Packing | 461 |
| Poison Bush | 314 |
| Poison for the Destruction of Noxious Plants and Useless Timber | 257 |
| Poison Pouch | 452 |
| Poisons in Relation to Stock | 233 |
| Poppy, Wild | 175 |
| "Potato Bush" | 451 |
| Potato Tuber Moth | 206 |
| Potatoes, Seed | 158 |
| Poultry Industry in Queensland | 211 |
| Power Kerosene—Its Use in Tractors .. | 318 |
| Practical Co-operation | 392 |
| Prickly-pear—Prevention of Further Spread | 92 |
| Primary Producers' Co-operative Association | 185 |
| Producer and Researcher | 99 |
| Production and Marketing | 186 |
| Production of Good Types | 452 |
| Project Club Members, School for | 80 |

GENERAL INDEX.

v.

| | PAGE. | | PAGE. |
|---|-----------------------------|--|-----------------------------|
| Project Clubs, Agricultural | 86 | Simple Things of Life | 180 |
| Proposed Banana Board | 184 | Sixth Tractor School at Gatton College | 245 |
| Proposed Honey Board | 185 | Size of Breeding Pigs | 235 |
| Proposed Strawberry Board | 256 | Skim Milk for Pigs | 316 |
| Pumpkin Beetle | 184 | Slippery Concrete Floors, Remedy for | 322 |
| | | Small Crops | 334 |
| Q. | | Smith, George Andrew | 179 |
| Queensland Agricultural Position | 121 | Smith, Go Back to Adam | 187 |
| Queensland Agriculture | 7 | Soft Pork, Cause of | 258 |
| Queensland Bananas in the South | 200 | Sorghum Native | 315 |
| Queensland Bananas, Quality of | 75, 86 | Southern Dairy Farm Competition— Points from the Report | 382 |
| Queensland Fruit in Sydney | 26 | "Sovereign Wood" | 177 |
| Queensland Grades Accepted | 201 | Specimens Identified | 74 |
| Queensland Kauri | 374 | Staff Changes and Appointments | 88, 180, 254, 319, 378, 456 |
| Queensland Poultry Industry | 211 | Stanthorpe District | 173 |
| Queensland Show Dates | 296, 352, 417 | Stanthorpe Fruit and Vegetable Levy Regulations | 255 |
| Queensland Society of Sugar Cane Tech- nologists | 405 | Statesmanship and Nature | 323 |
| Queensland Sugar Industry | 98 | Statesmanship, New | 320 |
| Queenslander Abroad | 3 | State Wheat Board Election | 185 |
| Queensland's Principal Insect Pest of Sugar-cane (Greyback Cane Beetle) .. | 23 | Stile for Fences, Handy | 389 |
| | | Stink Grass | 315 |
| R. | | Stock Foods Regulations | 182 |
| Radish, Wild | 74 | Strawberry Board | 322 |
| Rainfall in the Agricultural Districts .. | 22, 158, 240, 286, 354, 429 | Strawberry Board, Proposed | 256 |
| Rain-Forest Trees of Queensland | 70, 160, 208, 292, 354, 416 | Successful Science Students | 457 |
| Raising Seedlings | 191 | Sugar and Pineapples | 393 |
| Rattlepods | 314, 451 | Sugar Assessments | 458 |
| Redwood, American | 374 | Sugar-cane Growing in Queensland | 32 |
| Researcher and Producer | 99 | Sugar-cane Prices Boards (see also titles indexed under "C" ("Cane")) | 182 |
| Reviews and Abstracts | 404 | Sugar-cane, Value of Fertilisers | 270 |
| Rheumatism | 261 | Sugar Crop | 334 |
| Roses, Garden, Twelve Best | 467 | Sugar Experimental Plots | 398 |
| Roses, Winter | 321 | Sugar Industry in Queensland—The Facts Restated | 391 |
| Royal National Showground Improve- ments | 457 | Sugar Industry, Position of | 272 |
| Royal Society of Queensland | 381, 455 | Sugar Industry, Review of | 268 |
| Rural Life in Other Lands | 418 | Sugar Industry, Science Side of | 269 |
| Rural Routes in Queensland | 113 | Sugar Levies | 183 |
| | | Sunflower Seed for Pigs | 377 |
| S. | | Support for Cross-cut Saw | 317 |
| Sanctuaries for Useful Animals and Birds, New | 322 | Surplus Combs—Fumigation for Wax Moth | 463 |
| Sanctuary at Lake Pleasant | 257 | Swamp Mahogany | 451 |
| Sanctuary at North Pine | 257 | Swat That Fly | 187 |
| Sanctuary, South Coast | 459 | | |
| Sandalwood | 314 | T. | |
| School at Gatton College, Tractor | 245 | Talagai Holding—A Correction | 88 |
| School for Project Club Members | 80 | Tank Stand | 258 |
| School of Instruction for Pig Farmers at Gatton College | 255, 364, 459 | The Boy, the Farm, and His Opportunity | 328 |
| Seed Potatoes | 158 | Thinning Growing Crops | 262 |
| Seed Wheat in Queensland, Introduction of | 320 | Tomato, Winsall | 120 |
| Service before Self and Pelf | 186 | Tractor Owners, Hints for | 297 |
| Sheep and Wool (and Lambs) | 165, 243, 462 | Tractor School at Gatton, Sixth | 245 |
| Sheep, Flyblown—How to Treat | 168 | Tractors, Farm | 159, 438 |
| Sheep—An Effective Drench for Worms .. | 462 | Tree Groundsel | 374 |
| Sheep Investigation into Green Colora- tion of Wool | 381 | Tree Lucerne | 175 |
| Sheep Manure as a Fertiliser | 452 | Trees Suitable for the Roma District | 177 |
| Silage is Real Money | 464 | Tribute to the Journal | 256 |
| | | Turnip, Wild | 74 |
| | | U. | |
| | | Unseen Friends and Foes | 298 |
| | | Useful Trees | 85 |

VI.

GENERAL INDEX.

| | PAGE. | | PAGE. |
|--|----------|--|----------|
| V. | | Wild Ducks and Geese, Open Season for | 459 |
| Valedictory | 321, 396 | Wild Marjoram | 374 |
| Vegetable Levy Regulations, Stanthorpe | 255 | Wild Millet | 176, 313 |
| Vegetable Plots, Clean-up of | 381 | Wild Mint | 250 |
| Vidler, Edwin Lyle | 179 | Wild Poppy—A Poisonous Plant | 175 |
| | | Wild Radish or Wild Turnip | 74 |
| W. | | Winsall Tomato | 120 |
| Walker, the Hon. Harry F. | 394 | Winter Fodders | 334 |
| Watering Horses | 378 | Winter Roses | 321 |
| Weaning the Pig | 365 | Wintering Conditions for Bees | 461 |
| "Wedding Bells" (<i>Gardenia globosa</i>) .. | 451 | Woods Identified | 174 |
| Weed, Flannel | 452 | Wool, Green Coloration, Investigations | |
| Weeds of Queensland | 294, 352 | into Cause | 381 |
| Weevil Borer Investigation Committee | | Work | 2 |
| for Bananas | 183 | Worker and Churn, Care of | 296 |
| Western Plants Identified | 250, 315 | "Worm Seed" | 257 |
| Wheat Board | 182 | Worms and Lice in Pigs | 178, 253 |
| Wheat Board Referendum | 379 | | |
| Wheat Breeding, New Objectives in .. | 460 | Y. | |
| Wheat Crop | 334 | Yellow Grass (<i>Paspalum conjugatum</i>) .. | 316 |
| Wheat Crop Competition, Season 1928 .. | 148 | Yellow Oleander—A Poisonous Plant .. | 374 |
| Wheat-Flag Smut | 184 | Youth's Opportunity | 321 |
| Wheatgrowing Competition—Factors in | | | |
| Increased Yield | 379 | Z. | |
| Wheat, Seed | 320 | Zigzag Tillage Economy in Orchard | |
| White Scour in Young Pigs | 234 | Cultivation | 257 |
| Why the Sugar Industry is Protected .. | 392 | | |

INDEX TO ILLUSTRATIONS

| | PAGE. | | PAGE. |
|--|----------|---|----------|
| A. | | D. | |
| "Arsenic Bush" (<i>Cassia latifolia</i>) | 353 | Currambin Creek Deviation | 70 |
| Atherton Tableland Scene | 4 | Cutters at Work in a Typical Canefield, Babinda, N.Q. | 53 |
| B. | | E. | |
| Bacon Pig, Early Maturing | 127 | Ex-champion of Champions (sow "Brentwood Dorothy") | 444 |
| Bacon Pig, Carcass of | 134, 135 | F. | |
| Berkshire Type, Weaners | 365 | Fitch of Bacon, Heavy Over-fat | 142 |
| Bitumen-surfaced Road through Canefields | 62 | Fitch of Bacon, Prime Quality Deep-bodied | 143 |
| Black Gully Bridge | 63 | Flood Invert under Construction | 67 |
| Bred from Various Stock | 228 | From Field to Mill Loading Cane Trucks on Dr. Knowle's Farm, near Babinda, N.Q. | 38 |
| Bridge over Bannister's Lagoon | 117 | From Field to Mill—Ready for the Road, Babinda, N.Q. | 49 |
| Bridge over Barambah Creek, Curved Reinforced Concrete Low-level | 63 | Fungi | 341, 345 |
| Bridge over Barcoo River, Concrete | 61 | Fungi, Fruiting Bodies of | 349 |
| Bridge over Paroo River, Low-level Reinforced Concrete | 67 | G. | |
| Brisbane-Gympie Road | 115 | Gin Gin-Miriam Vale Road | 64 |
| Brisbane-Ipswich Road, Experimental Section | 114 | Granadilla, Large-fruited | 306 |
| Brisbane-Mount Lindsay Arterial Interstate Road | 68 | Grand Champion Chester White | 312 |
| C. | | H. | |
| Cambooya-Goondivindi Road | 65 | Ham | 144 |
| Cane Farmer's Homestead and Crop, near Redlynch, Cairns Railway | 34 | Haughton River Low-level Bridge | 116 |
| Canefields at the Foot of Bartle Frere | 45 | Heifer Creek Deviation | 65 |
| Cane, Hauling to the Mill | 58 | I. | |
| Caponizing | 229-233 | Inglewood-Texas Road, Gravelled Section | 66 |
| Collinsville-Mount Coolon Road | 119 | J. | |
| Coochin Coochin— | | Junior Pig Farmer and His Pig | 146 |
| A Peaceful Pool on | 197 | K. | |
| Apple-tree Avenue on | 248 | Kuban-Longlands Gap Road | 120 |
| Arable and Pasture Lands | 110 | | |
| Country from Minto Crag | 265 | | |
| Rich Agricultural Lands with Minto Crag as a Background | 435 | | |
| Rich Pasture Land with the Macpherson Range as a Background | 331 | | |
| Collinsville | 253 | | |
| Swimming Pool | 331 | | |
| Views | 454 | | |
| Coombah Creek Bridge | 68 | | |
| Cooran-Kin Kin Road | 115 | | |
| Country School in Queensland | 420 | | |
| Crop of— | | | |
| "Clarendon" | 149 | | |
| "Currawa" | 155, 157 | | |
| "Duke of York" Variety | 150 | | |
| "Florence" | 157 | | |
| "Novo" Wheat | 154 | | |
| "Pusa" | 149, 151 | | |
| "Three Seas" Wheat | 154 | | |
| "Watchman" | 150 | | |

VIII.

GENERAL INDEX.

INDEX TO ILLUSTRATIONS—*continued.*

| | PAGE. |
|---|-------|
| L. | |
| Lantana | 295 |
| Litter, An Unprofitable and Expensive | 125 |
| Litter, A Prize-winning | 369 |
| Litter, A Thrifty Profitable | 366 |
| Live Stock, British Breeds of | 360. |
| Lockyer Ward Conference, Delegates and Farmers | 6 |

M.

| | |
|---|-----|
| Main South Coast Road | 114 |
| Main South Coast Road, near Southport | 69 |
| Middle Yorkshire Weavers' Prize-winning | 367 |
| Motor Boat Conveying Farmers' Children to Maroochy River State School | 430 |
| Mount Ossa-Kungurri Road | 62 |
| Mudgeeraba-Springbrook Road | 69 |

N. 1

**Nature Study is an Important Section of
the Young Bush Queenslander's Educa-
tion** 431

Q.

| | |
|---|-----|
| On the Way from Gordonvale to Little Mulgrave River | 117 |
| (Old Maryborough-Gympie Road, Main- tenance, Gravel on | 116 |
| Osborne, Mr. Wilfred L. | 241 |

P.

| | |
|---|-----|
| Passion Fruit, Redland Bay | 308 |
| Pen of Typical White Leghorns | 220 |
| Pigeon Berry Ash (<i>Cryptocercus erythro-</i> <i>cylon</i>) | 292 |
| Pigs, Points of the | 293 |
| Plan of Turn Table and Dip | 239 |
| Plough Draft, Adjusting | 237 |
| Poultry Farm in Queensland | 223 |
| Poultry House, Good | 215 |
| Purcell, Mr. James | 242 |

| | |
|--|-------|
| | PAGE. |
| Q. | |
| Queensland Society of Sugar Cane Technologists | 405 |

R.

Roma-Northern Road, Arresting Creek
Erosion Across Road 66

S.

| | |
|--|----------|
| Scholars of Stone School, near Ingham .. | 432 |
| Scrub Box, Large (<i>Tristantia conferta</i>) 355. | 356 |
| Slide Cutter .. | 422, 423 |
| Sow, Gloucester Old Spot .. | 450 |
| Sow of the Middle Yorkshire Breed, Breeding .. | 443 |
| Sow, Poland-China .. | 449 |
| Sows of Uncertain Breeding, Farm .. | 448 |
| Sow, Typical Prize-winning Tamworth .. | 446 |
| State School Garden in Sunny Queensland | 466 |
| Stile for Getting over Dividing Fences .. | 389 |

T.

| | |
|---|----------|
| Toowoomba-Goondivindi Road | 64 |
| Tulipwood (<i>Harpullia pendula</i>).... .. | 161, 162 |

U.

| | |
|--|-----|
| Utility Orpington Cock, A Good Type of | 225 |
| Utility Orpington Hen, Prize Winner at Many Shows | 227 |

W.

| | |
|---|----------|
| Walker, Hon. Harry F. | 395 |
| "Waratah" Wheat | 155 |
| Water Gum (<i>Tristania laurina</i>) | 416, 417 |
| Weaners of Berkshire Type | 365 |
| Weaners of Middle Yorkshire Breed, Prize-winning | 367 |
| White Bean (<i>Vilanthus malabarica</i>) | 209, 210 |

Y.

Yellow Tulip (*Hemicyclia australasica*) 71, 72
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QUEENSLAND AGRICULTURAL JOURNAL

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PART 1.

Event and Comment.

It was a Good Year.

TAKEN all round the year just ended was a good one for Queensland agriculture. Most farming districts continued to make steady progress. On all sides are signs of healthy expansion which followed generous and well-distributed rains over most of the closely settled areas. A wider appreciation of modern methods of husbandry is becoming general. There are evidences, for instance, that the Queensland dairyman is no longer content to tolerate star boarders in his herd, and the same spirit is becoming characteristic of every branch of rural industry. In this healthy progress the Department of Agriculture and Stock has been no small influence. Every encouragement is given by it to the strengthening of the bond of interest and sympathy between farmer and official. The Department prides itself on its accessibility and service to all engaged in the work of the country and, as a consequence, is accepted by farmers as a wise guide and a firm friend in difficulty. In all our rural enterprises there is a growing disposition to take the broad and long view of our problems and co-operate whole-heartedly with the Department in its efforts towards agricultural stability. The last Annual Report of the work of the Department by the Under Secretary (Mr. Graham) and its appendices, show unmistakably that the heads of departmental divisions and their staffs are closely informed with all that is happening to all forms of husbandry in the field, on the run, and in the factory, and there is a certainty about their reports that stamps them as men who know their job and are very keen on it.

In the course of a notable address to a ward conference of members of the Lockyer Local Producers' Associations, and which is presented at length in this issue, the Minister for Agriculture and Stock (Mr. W. Forgan Smith) described the wide range of interests and duties covered by officers of the Department and the

immense value of their services to the farming industry, and consequently to the State. In that fine address the Minister showed how closely inter-related are the activities of the Department and the work of the man on the land, right from the turning of the furrow to the selling of the product.

Though much has been done in the extension of this service there is much more to do, and in the coming year the Department looks naturally to the farmer for hearty and practical co-operation in the effort to place and keep Queensland among the foremost agricultural countries of the world. As the Minister has pointed out, Queensland, a pioneer in land settlement, has quite fittingly become a pioneer in agricultural organisation, and this phase of her enterprise is continuing to attract inquiries from other countries seeking information as to the form of agricultural organisation and marketing control initiated by the Queensland Government for the benefit of the Queensland farmer. Only the other day further requests for information were received from noted economists in California, and these serve to indicate the extent of the world interest in Queensland's efforts to scientifically organise its rural industries, and may be regarded as some slight recognition of our claim as a pioneer in the field of social and economic reform.

Work.

IT was Elbert Hubbard who said that once men thought work was a curse; then it came to them that it was a necessary evil; and yesterday the truth dawned upon them that it is a blessed privilege. In his impressive seasonal message to the citizens of Queensland the Minister, Mr. Forgan Smith, as Deputy Premier of the State, possibly had something like that in mind when he pointed out the nobility of the simple task and the wisdom of our starting the New Year well by performing satisfactorily the duty that lies closest at hand. After all no really healthy-minded man could endure a life of idleness or futility, least of all Australians with a continent to conquer and only the spade work yet done. To labour is to pray, as the old philosopher had it, and the dignity of worth is really built on how we do our day's work. Time and the angels are on the side of the man or the people who do the work of the world; and humanity, healthy humanity, has no time for parasites. The world used to be divided into two classes, masters and slaves. Later on they became gentlemen and workers. The designation was altered, but the relationship remained practically the same. To-day, the vast majority of us are workers and glad to be workers believing in ourselves, appreciating the dignity of the common or necessary task and its successful performance as a lift along the road to better things, both for ourselves and posterity.

The Economics of Dairying.

OVER in New Zealand, an investigation, similar to that entered into recently in Queensland, has been made into the economics of the dairying industry and with very much the same results. For the purposes of the inquiry it was considered, broadly speaking, that rural economics may be divided into two sections—management and marketing. The whole of the attention of the official investigators, in this instance, was devoted to the side of farm management. It was held that the analysis of management factors would be very useful to both present and prospective settlers; and that the systematic collection and study of facts relative to a large number of farms would provide a fund of information of great assistance to the farmer, and which would, ordinarily, be beyond his reach. Accordingly a complete survey of conditions as to production and costs was made on two hundred dairy farms. The first object was to determine what was the most important factor in dairying, and that of production per acre or per cow was the conclusion reached. That is precisely what our own Departmental Economic Committee decided after a close study of the position and conditions of the industry in Queensland. Interests, rates, maintenance, and general charges must all come out of the land and, as far as possible, every acre should return its fair proportion of the expenses of the whole enterprise. Summarised, the general conclusions arrived at by the New Zealand investigators were the necessity of aiming at higher production per acre, and raising herd production averages, which, in the long run, amounts to very much the same thing. Other points brought out were that proper feeding of the herd

is of greater moment than breeding high producers, but to us there is no apparent reason why these should not go together; and that where there is sufficient feed for all the animals, it is unsound to cull unless the discarded cow can be replaced by a higher producer. The advantage of top-dressing of pastures was also made clear to the investigators. Maintenance expenses over all the farms worked out at about £5 per cow, and this they accepted as a sound general figure. On the same basis of inquiry it would be interesting to find out just how much the Queensland cow has to produce before her owner can collect a profit.

A Queenslander Abroad.

LIKE most Australians who go abroad, Mr. W. T. Harris, the Secretary of the Co-operative Dairy Association, who last year enjoyed a well-earned holiday on a world tour, has come back a better Australian. He had the good fortune of being able to visit many of the older dairying countries, including Canada, Great Britain, the Irish Free State, and Denmark, and what he saw intensified his enthusiasm for the Australian system of co-operation. Everywhere he went he found an interest in Queensland's rural legislation, and he was never tired of quoting it as evidence of our progressiveness. There were systems, methods, and ideas, too, which he found worthy of our adoption, and other points in dairy practice worthy of our emulation. Let Mr. Harris tell portion of his story in his own words:—

"I'm satisfied Queensland can hold her own against the world so far as the dairying industry is concerned. I believe we should use every endeavour to increase production and quality, but it is satisfactory to know the co-operative associations in this State have done well.

"I travelled through England, Scotland, and Ireland. The growth of the industry in Ireland is remarkable. The value of her exports to England last year was £4,000,000 and she will be a serious competitor with Denmark for that trade. The quality of the Irish product has improved out of all knowledge.

"In Denmark I found that the factories were not better equipped than our own factories. The best butter is exported to London, and yet the average Dane eats margarine instead of butter because of its relative cheapness. Denmark is a remarkable little country, and there herd testing is carried on methodically. Denmark is producing more butter than ever and in 1926 her production was 4,200,000 tons of milk, yet dairymen there did not appear to be very prosperous as we in Queensland understand prosperity. They have to spend all their money in foodstuffs and fertilisers and have to scratch for a living from daylight to dark. The butter not exported is consumed in the country, but it is an extraordinary fact that the Danes consume four times as much margarine as butter.

"In the Fraser Valley in Canada I found herd testing carried out on an excellent system and the conviction was forced on me that the factory managers in Queensland must encourage herd testing in every possible way. No country in the world, however, can hold its own against Australia so far as climatic conditions for dairying are concerned.

"In London I found it was a moot point whether Australian butter was consumed as "Australian" butter. There is a good reason for this probable loss of identity and that is—lack of a continuity of supply. English distributors handle blended butters. The English people cannot afford to use butter as generously as we do. They want a butter that will spread readily and thinly. Australians eat the best butters and are not used to skimping themselves either, but other peoples are not so favoured in this respect as we are. Whisky, coffee, and cigarettes are blended, and I cannot see any reason why butter should not be blended. Retailers have to supply what consumers want.

"Australia's great butter difficulty in London is lack of regular supplies and every effort must be made to remedy that state of affairs. I was not impressed with the advertising campaigns conducted in Great Britain on behalf of Australian butter. F.O.B. sales do, in my opinion, a great deal of harm. With such a method of selling, market prices are not maintained at proper levels and I would advise factories against selling butter f.o.b. I am glad to be home again and am anxious to do what I can to assist in maintaining Queensland's proud position in the dairying industry."

*The Compliments
of the Season
and hearty
Good Wishes
For the
coming year.*

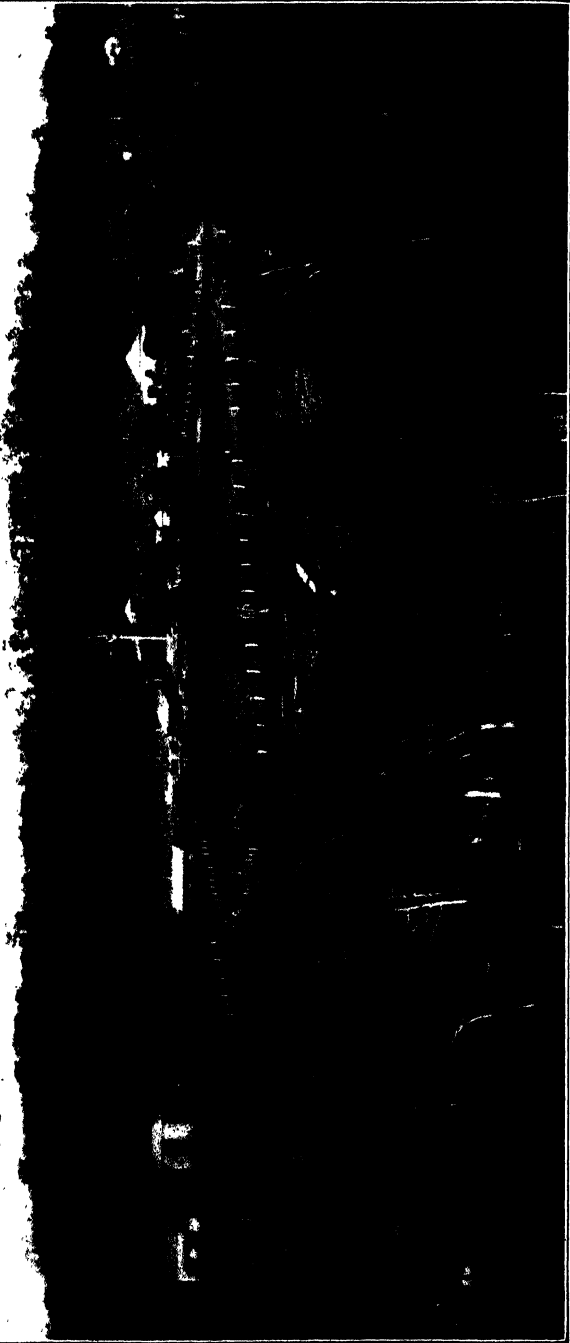


PLATE I.

A Scene on the Atherton Tableland, North Queensland. One of the richest potential agricultural regions in the world. A modern dairy farm, walled in by tropical jungle.

The Minister's New Year Message

To the Citizens of Queensland.

The Deputy Premier and Minister of Agriculture and Stock, Hon. W. Forgan Smith, included in his seasonal greetings to the citizens of Queensland the following impressive message :—

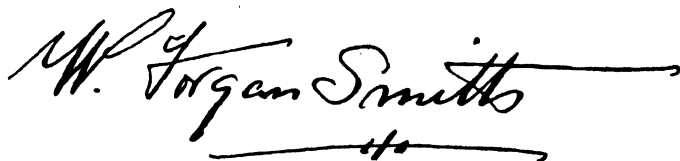
"Our duty as citizens of the Commonwealth, as contributors to the work of our generation, is to take our share of the difficulties and the dangers of common enterprise, as well as its rewards and profits.

"The coming year and the future generally will make demands on our courage, resolution and goodwill, and our skill in constructive citizenship. It is an accepted axiom that civilisation makes progress only so long as the courage of man responds to the human needs of each generation, and so we should not allow ourselves to visualise our destiny as a permanent soft job. The task of humanity is a hard one, destined to become harder with the passing of the years, and we must guard against any weakening of our national character, lest we endanger our inheritance from the pioneers.

"The road to achievement lies through work and the capacity to endure, and our progress demands a clear perception of the dangers and the difficulties that beset our times, together with a realisation of the value of the common task, backed by a resolve to get our job done and done well.

"Citizenship is a responsibility as well as a right, and we should regard it as a privilege to serve the State in any capacity. Service is the greatest test of character, and determines the greatness or otherwise of a nation as well as individuals.

"There is no better country in the world than Australia, and if we are brave enough and good enough we can make it a better place still. Let our resolve, therefore, be to always work with this objective in view, and we can commence with the duty that lies nearest to us."

A handwritten signature in dark ink, reading "W. Forgan Smith". The signature is fluid and cursive, with a long horizontal flourish extending to the right. Below the signature is a small, stylized mark that appears to be "WFS".

Deputy Premier.



PLATE 2.—GROUP OF DELEGATES AND FARMERS WHO ATTENDED THE LOCKYER WARD CONFERENCE OF LOCAL PRODUCERS' ASSOCIATIONS AT GATTON COLLEGE ON 27TH NOVEMBER, 1928.

The Deputy-Premier and Minister for Agriculture, Mr. W. Forgan Smith, M.L.A., is fifth from the left in the front row; Mr. George Logan, M.L.A. (Member for the District), is on the Minister's right, with Professor Murray and Mr. W. A. Fielding (Chairman of the Conference) on the Minister's left.

AGRICULTURE IN QUEENSLAND.

SYSTEMATIC ORGANISATION OF RURAL INDUSTRY.

MINISTER'S COMPREHENSIVE REVIEW.

WHAT THE DEPARTMENT OF AGRICULTURE AND STOCK IS DOING—
STATE FARMS—GRAIN PROPAGATION AND IMPROVEMENT—
SCIENCE AND FARMING—POOLS IN OPERATION—SUGAR GROWING
AND DAIRYING—FARMER'S WOOL SCHEME—PIG AND POULTRY
RAISING—DEPARTMENTAL ORGANISATION.

"We have provided all necessary legislative machinery to assist in the extension of agriculture, with a view to improving the conditions of those engaged in primary production.

"Co-operative activity is the most significant social and economic factor in the life of the community to-day, and, according to the manner in which it is developed and controlled, so will the future of the various industries be determined.

"I look to the farmers and those interested in agriculture generally to be loyal to their own organisations; to help so far as in their power to place them on a better and more stable footing; to elect leaders distinguished for their honesty of purpose, vision, and capacity; and to co-operate also in all the efforts that are being made by my Department to improve the standards of production and efficiency generally in industry."—*Hon. W. Forgan Smith.*

AT a Ward Conference of the Local Producers' Associations of the Lockyer District, held at the Queensland Agricultural High School and College at Gatton on Tuesday, 27th November, the Deputy Premier and Minister for Agriculture and Stock, Hon. W. Forgan Smith, delivered a notable address, in the course of which he reviewed the organisation and activities of his Department and its influence on rural industry in Queensland.

Mr. W. Forgan Smith was present at the invitation of the Executive of the Laidley and Grantham Wards of the Local Producers' Associations. Mr. W. A. Fielding, of the Laidley Ward, occupied the chair, and in welcoming the Minister to the Conference said that "personally he had come in contact with the Minister of Agriculture before he had come to the Lockyer district, and putting party politics aside, he could say that in Mr. Forgan Smith the man on the land had a most sympathetic Minister—a practical man, out to assist the farmers. He could also state that if any body of farmers put up any practical scheme or request to the Minister he would do his best to see that the request be granted. There was no splitting of straws with the Minister, who was straight out. The Minister's interests were those of the farmers in trying to bring about better conditions for them." (Applause.)

Following is the text of the Minister's remarks:—

In the immediate post-war period, agriculture, not only in Queensland and Australia but throughout the world, was faced with perplexing and unprecedented difficulties. So far as legislation could be applied to both cause and effect, it was applied in Queensland in a series of enactments that have aroused the interest and often inspired the emulation of authorities in other States and other countries. Queensland, a pioneer in industry and settlement and social improvement, became again a pioneer in agricultural legislation.

Systematic Rural Organisation in Queensland.

As a result of these activities, cotton growing, practically non-existent, was raised to a promising industry. Systematic organisation of rural industry along co-operative lines was initiated. The Council of Agriculture, together with subsidiary

organisations under farmer control, were established. The system of pooling of primary products was widely extended, and a fruit marketing system organised. The co-operative movement was strengthened; banana-growing was brought under strict white labour conditions, making it an entirely white man's industry. The stabilisation of the meat and dairying industries was advanced long stages nearer accomplishment. The Commonwealth Sugar Agreement was renewed. Sugar Cane Prices legislation was adjusted to make its operation more equitable to the growers. Advances to settlers were liberalised. The poultry industry was protected to the extent of minimising, as far as possible, the incidence of disease. A practical scheme for the improvement of draught farm horses was launched successfully. Protection was given to farmers and orchardists in relation to specifics for insect pest destruction. Bird and animal sanctuaries were increased in number and area. The scientific and technical branches of the Department of Agriculture and Stock were extended, and the system of departmental publicity made more comprehensive in respect particularly to the effective filming of Queensland at work in rural industry as part of a considered scheme of rural educational propaganda. Legislation providing for organised marketing was also passed.

To the man on the land Agriculture and Stock is the most important of our administrative departments, and there are few countries in the world where the welfare of the farmer is more concern of efficient and experienced officers than in Queensland. In every phase of inland enterprise, guidance is freely given by men whose personal knowledge of local conditions in every district and practical experience are at the disposal of anyone embarking on a life on the land.

Through the Sugar Experiment Stations the canegrower has the benefit of scientific advice and field service on the farm in every branch of his calling. Cane varieties are tested under every-day conditions, and cane sets supplied to the farmer. Sugar-mills, on the boards of which growers are represented directly, have been established in every chief sugar district. The price of the product is regulated equitably by Cane Prices Boards, and through them every interest concerned is assured of a fair and square deal.

Queensland, a pioneer in industry and settlement and social improvement, is also a pioneer in agricultural legislation.

Specialists and graders give the farmer every possible assistance in respect to cotton cultivation, and the whole available resources of science and the services of a highly trained corps of scientists are at the call of the agriculturist in Queensland.

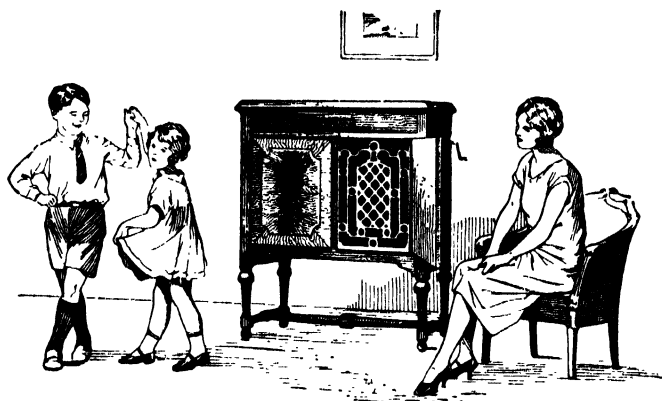
Queensland is the only country in the world in which dairying is conducted in the tropics successfully on a big scale. Ninety-eight per cent. of our butter production and 96 per cent. of our cheese output are produced co-operatively under farmer control.

Dairy instructors and inspectors operating throughout the producing regions are well equipped with the knowledge necessary to assist and inform the dairymen in every way. The dairy farmer has the advantage of expert advice on all matters relating to his calling, from sowing and improving pastures, through every phase of animal husbandry, to manufacturing, right to landing his finished product in cold store or on the London and other overseas markets. Herd testing and breed improvement each claim practical attention and direction.

Pig and poultry raisers are provided for amply in respect to expert advice. In every fruitgrowing district field instruction in cultivation, in contending with insect and vegetable pests, in grading, packing, shipping, and marketing, in the cultivation and marketing of tropical fruits, is available.

The service and advice of experienced veterinary surgeons are always available to any stockowner in difficulties or needing practical guidance in any way. Similar services are available in respect to sheep and wool. Clips up to 1,500 fleeces from any one holding are classed at nominal cost and prepared for the salesmen's catalogues. In this way the interests of the small flockowner are conserved and his clip presented to the buyer in the best marketable form.

In agricultural chemistry the Queensland farmer is served by men most eminent in their profession, and who form the staff of probably the best equipped laboratory of its kind in Australia. A special branch of the Department devotes itself to the protection of the farmer in respect to ensuring that seeds, stock foods, fertilisers, and specifics for pest destruction are kept up to prescribed grades and standards.



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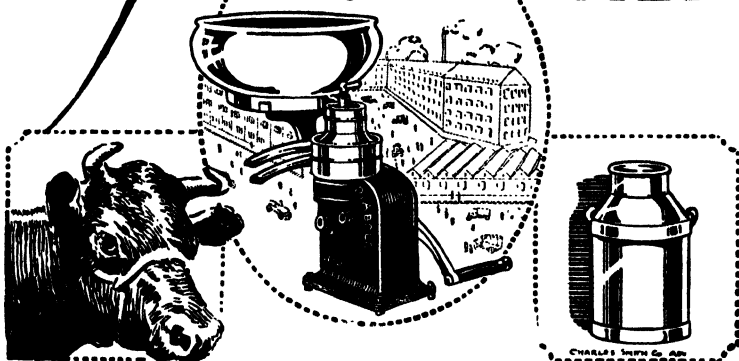
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The excellent public services that have been established by the Queensland Government and are being extended to meet every development in agricultural progress in this State are detailed as follows:—

WHAT THE DEPARTMENT IS DOING.

The Department of Agriculture is administrative, educational, and co-operative, the latter in so far that circumstances frequently call for the financing of rural enterprises as well as assistance to the individual farmer. The Government is always ready and willing to aid his industry in every practical way. Field practice, scientific research, and the economics of agriculture are all covered by the activities of the Department in its encouragement of primary industries.

Agricultural Activities—State Farms.

Roma State Farm, situated some 4 miles from Roma, comprises 780 acres adjoining Bungeworgorai Creek. A considerable area is devoted to wheatgrowing, whilst the balance is used for fodder crops, orchard, and grazing purposes. This farm specialises in the breeding of wheat for Queensland conditions, and a number of the wheats now in cultivation in Queensland have been evolved at this farm. Additional promising varieties have recently been brought into cultivation.

Gindie State Farm, 15 miles from Emerald, in the Central district; area 16,000 acres. This farm is used principally for the breeding of beef Shorthorns, and a high-class stud is maintained. Two small horse studs—Suffolk Punch and Clydesdale—are carried on here. Young animals are bred at Gindie for the purpose of improving the stock of farmers and graziers, and the stud is continually being improved by the purchase of fashionably-bred sires.

To the man on the land Agriculture and Stock is the most important of our administrative departments, and there are few countries in the world where the welfare is more the concern of efficient and experienced officers than in Queensland.

Kairi State Farm, between 600 and 700 acres of typical scrub land, is situated in the heart of the Atherton scrub. Developmental work has been pushed on, and approximately 500 acres are now cleared, or in the process of clearing, and under grass. About 100 acres are cropped to provide grain and fodder for farm stock, and a number of miscellaneous and experimental crops are raised. The stock consists of Illawarra, Shorthorn, and Jersey studs, which are maintained for the improvement of district stock. A high-class Berkshire stud is also carried on, and a small stud of Tamworths has recently been established. A Suffolk Punch stallion is kept for the use of farmers in the district. A cane nursery has been instituted for the purpose of rehabilitating cane grown on coastal areas.

Home Hill State Farm, situated at Home Hill; area 311 acres, portion of which is capable of being irrigated, and is used mainly for the purpose of raising supplies of cane of new and approved varieties for distribution to local sugar farmers.

Field Experiment Plots.—A system of establishing experimental plots on various farms situated in the Northern, Central, and Southern districts was initiated a few years ago. Plots are established for variety trials, seed propagation, and seed improvement purposes.

Pasture Improvement Trials.—Latterly experiments have been carried out in the Northern and near North Coastal districts for the purpose of carrying out improvement trials in pastures, in combination with fertiliser experiments.

Agricultural Operations Generally.

The Department provides expert advice in cultural operations, and this is at the disposal of the farmers in every district. For the purposes of administration the State is divided into three divisions—Southern Central, and Northern. A senior instructor with the necessary staff has been assigned to each division, and specialists are engaged in advisory and experimental work peculiar to each province.

Wheat Propagation and Improvement.

A scheme of wheat propagation plots is carried on in conjunction with the Wheat Board, and its value has been proved particularly in regard to (1) the bringing of improved varieties into cultivation; and (2) the maintenance of purity

of type of wheats cultivated. In addition wheat experimental plot work is carried out in certain districts in co-operation with local growers. The results of this work are shown in improved yields and higher bushel weights.

The seed wheat raised and distributed by the Department has undoubtedly been of substantial economic advantage to the wheatgrowers of the State. The Director of Agriculture (Mr. H. C. Quodling) and his assistant (Mr. Clydesdale) have charge of this work.

In addition, paspalum pasture renovation work has been carried on, and sound results obtained. Added to this work was assistance in broom millet and maize seed selection, silage demonstrations, and dairy and pig fodder experimental work. Accounts of these activities are set out in the Departmental Annual Report.

Maize Improvement.

Seed maize improvement work is being carried on systematically by Instructor C. McKeon, and among the more important results obtained under this head is the development of a special type of grain ("Durum" Maize) suitable for growing in the moister regions, such as the Atherton Tableland.

Other Crops.

Other crops that come within the range of practical field attention include peanuts, tobacco, potatoes, green manuring crops, cassava, arrowroot and sweet potatoes, onions, summer and winter fodder, sorghums, lucerne and other fodder crops, root crops, cotton, tomatoes.

Fertiliser and cultural trials have also been carried out in respect to these and other crops by and under the direction of the Senior Instructors in Agriculture in each Division (Messrs. Gibson, Brooks, and Pollock, respectively).

Analytical Work.

The Agricultural Chemist and his staff are engaged throughout the year in analysing soils, waters, dairy and other produce, and other substances.

The Departmental laboratory is regarded as the most modern and best equipped in the Commonwealth.

The whole available resources of science and the services of a highly trained corps of scientists are at the call of agriculturists in Queensland.

The Seeds, Stock Foods, Fertilisers, and Pest Destroyers Investigation Branch has been established to safeguard the farmer from imposition in respect to the quality of these commodities when they are offered for sale.

This section of our scientific service to the farmer is very little known to the general public. In fact, it is a matter for wonder why public interest in science generally is usually so very small. It is rather extraordinary that this should be so since anybody who takes the trouble to inquire even into the history of scientific thought and method, and still more into that of any particular discovery or generalisation of economic value, is immediately struck with the peculiar pleasure to be derived from actual scientific pursuits. The indifference of the large mass of people to those pursuits which are designed especially to make them happier and more comfortable is remarkable. Is it because most of us prefer to be impressed rather than be convinced?

Though science enters into every phase of our existence, there does not seem to be any spontaneous recognition of the fact. Behind all our modern marvels, (radio, which is regarded as one of the miracles of the age, and the rest), there is a vast field of research, and behind all our progress in agriculture you will find the long and patient effort of the scientist to whose vision and energies we owe so much of our material wealth and every-day comfort.

The Chemistry Branch of the Department may well be described as a "silent service," and like most services of that character its record is a record of work well done, of continued effort and continued achievement from which has come much of our wealth and progress in rural industry, which we are now beginning to recognise and properly appraise.

Our Agricultural Chemical Laboratory has, over the thirty years since its establishment, worked up from a one-man show to its present high state of efficiency, both in personnel and equipment.

Over a long series of years the Branch has performed much valuable work for the farmer, the results of which are readily available in many publications that are really text-books on the industry. That work covers improvement in fodders and grains and field crops generally; both fundamental and applied research in respect to fertilisers, pasture improvement, dipping fluids, pest destroyers, and stock foods. Among the most useful of the activities of this Branch was the work carried out in fertilising experiments for bananas on land which had been under cultivation for as long as fifty years, and which, through exhaustion, had become practically barren. By proper and thorough cultivation and manuring, the soil on this area, on principles and practice laid down by the Agricultural Chemist, was brought up to the fertility of virgin land.

In addition, a close survey of soils of agricultural districts has been made. This revealed in some districts a distinct depletion of plant foods, and the Chemist set out to correct them by demonstrating, to the advantage of the industry, the necessity of improving methods of cultivation and of using, judiciously, artificial fertilisers where their need was proved.

Added to all these avenues of investigation there is the regular routine work of the Branch, which covers, among other important work, a comprehensive series of analyses of great importance to the manufacturing as well as to the primary side of agricultural industry in Queensland. These analyses number many thousands in the course of the year, and include a wide range of tests among the chief of which are analyses of stock foods. The Chemist also collaborates with the agricultural specialists in carrying out a regular series of field experiments, pasture renovation and improvement, and fodder plot trials.

Stock Nutrition Experiments.

Another very valuable investigation was made into a sheep problem, the main points of which were small lambing percentages and malnutrition. This led to the recommendation of a stock lick which has already through its use on several holdings doubled the stock carrying capacity, even in drought years, on certain areas. Other similar investigations that produced remarkable and satisfactory results have covered feeding experiments with sheep, to ascertain the percentage

Queensland is the only country in the world in which dairying is conducted in the tropics successfully on a big scale. Ninety-eight per cent. of our butter and ninety-six per cent. of our cheese is manufactured co-operatively under farmer control.

of digestibility of various common fodders under our climatic conditions; practical feeding experiments, which were carried out at Wallumbilla to get a true idea of the food value of prickly-pear when used for milk cows, steers, and sheep; an investigation on plants poisonous to stock, more particularly a full investigation on plants containing a hydrocyanic acid yielding glucoside, like those of the sorghum family and others; analyses of tanning contents of Queensland wattles and mangrove barks; and the inauguration of seed testing, which culminated in the establishment of a separate departmental seed-testing laboratory which is the most complete, up to date, and efficient in any of the States of the Commonwealth.

Reverting to the inquiry into the sheep problem presented by cases of malnutrition and lambing losses in the Central District, and as a solution of which the Chemist had recommended—as a result of his investigations—the use of a stock lick, this is what one grazier had to say in the course of a report on its effect—

“Since using this lick I have not seen a sign of sickness nor have I drenched for worm. My usual carrying capacity prior to using was about a sheep to 2 acres, or 40,000 sheep. Results have proved so satisfactory that I have gradually increased the numbers, until at the commencement of the 1926 drought I had 85,000; 15,000 went away in September, leaving 70,000 which are still all in good, strong condition, and from which there has not been more than the normal losses.”

From results like that we get some idea of the economic value—the real money value—of the work of the Chemist, and what it means to the State; and also what agricultural science is doing for the industry in Queensland. And we also learn to appreciate the high public services of other good workers in the vineyard who,

through their field and laboratory effort, have accomplished much and have either gained or saved, actually or in prospect, for both the State and Commonwealth, many millions sterling.

An Efficient Publicity Service.

Before passing on to a consideration of other institutional factors in our rural progress, reference might be made to a difficulty that has always confronted the research worker and other technical workers in agriculture—that is the difficulty of getting widespread and speedy publicity for the results of their work. The application of the knowledge gained by research to daily farm practice must always be slow, but there is no reason why we should not do our best to speed up the process. The Department recognises this, and has provided an efficient publicity service which embraces the "Queensland Agricultural Journal" and leaflets and bulletins, all of which are issued by the Department of Agriculture to the farmer without charge.

'A Nation of High Standards.'

Purely material resources, essential as they are, are worth little if the people who own them do not know how to use them. Intelligence, courage, and keen enterprise must be applied to the development of wealth from its crude to its finished form.

As Australians we have cheerfully and deliberately chosen to be a nation of high standards, and we have to just as cheerfully and deliberately pay the price of a high civilisation—as a matter of fact we must—in high average efficiency. In Queensland, so far as agriculture is concerned, it is our aim to get the best out of our job of developing a vast primary industrial State. The job is a big one, but we are learning to make the fullest use of the tools of education and intelligently controlled energy in a workmanlike way. In agricultural progress particularly in Queensland we have done pretty well so far, but naturally we have got to keep on evolving new ideas as to how we can do better, for modern conditions demand increased efficiency in every avenue of life, and increased efficiency means high standards, a high degree of comfort, and a complete national life.

In agricultural chemistry the Queensland farmer is served by men most eminent in their profession, and who form the staff of probably the best equipped laboratory of its kind in Australia.

ORGANISATION OF THE AGRICULTURAL INDUSTRY.

The first Primary Producers' Organisation Act was passed in 1922, and crystallised the Government's policy for the organisation of the farming community. The cost of the council was borne at the commencement by the Government, but by the amending Act passed in 1923 the council was empowered to make levies on primary producers for administrative and other purposes, subject to certain conditions, which included, in the case of special levies, provision for primary producers having a vote to decide whether or not a special levy should be made.

In the original Act the organisation was on the following basis:—A Local Producers' Association was formed in every centre where a minimum of fifteen primary producers decided on that course. The agricultural areas of the State were divided into nineteen districts, and all the Local Producers' Associations in a district had the right to elect a District Council. Each of the nineteen District Councils appointed one member to the Council of Agriculture, which in addition had the Minister as president and five Government representatives. From the working of the Council it was demonstrated that to have the organisation on a commodity basis would be preferable, and with this object in view the Act was amended in 1925 to permit of Commodity Boards having direct representation on the council.

As the change was somewhat in the nature of an experiment, the actual details of the system of reorganisation were left to the Governor in Council, and as a result the new council was organised in October, 1925, on the basis of—

- 8 representatives from 8 District Councils,
- 8 representatives from 8 Commodity Boards,
- 4 representatives of the Government,
- 1 Minister as president,

—
21 in all.

The experience of the change was of such a nature that in 1926 the organisation by legislative enactment was put wholly upon a commodity basis. Each industry has now the full control of its own affairs, and the farmers elect their own different boards, and each of them functions with full authority in its own particular industry. From the various Commodity Boards representatives are chosen who act on the Council of Agriculture. The power of the Council of Agriculture to raise levies has been removed and diverted to the Commodity Boards, which finance the Council by means of precepts.

Since the inception of the Council of Agriculture in 1922, up to the 30th June, 1927, the Government assisted the council to the extent of £103,481.

In 1926 the Primary Producers' Organisation and Marketing Act was passed, and this was primarily a consolidation of and improvement upon the then existing Primary Producers' Organisation Acts and Primary Products Pools Acts, which were both repealed, but in the consolidated Act there have been retained the principles of both repealed measures, but the organisation of primary producers is now on the following basis:—

(1) There is a Council of Agriculture.

(2) The Council is composed entirely of representatives of each of the Pool Boards and Commodity Boards. This means that the producers are organised entirely on a commodity basis, and the actual council at present consists of an elective chairman; the Director of Marketing; two representatives of the Butter Board; and one representative each of the Queensland Cane Growers' Council, the Egg Board, the Broom Millet Board, the Committee of Direction of Fruit Marketing, the Peanut Board, the Cheese Board, the Wheat Board, the Cotton Board, the Atherton Tableland Maize Board, the Arrowroot Board, and the Northern Pig Board.

In 1928 occasion was taken to amend the "*Primary Producers' Organisation and Marketing Act of 1926*," with the result that all our agricultural organisation legislation has now been widened and consolidated. The provisions of the Act are now applicable to all primary industries including fruit and wheat.

The Department of Agriculture and Stock is administrative, educational, and co-operative. The Queensland Government is always ready and willing to aid agriculture in every practical way.

Pools in Operation.

Some idea of the scope of marketing by controlled boards in this State is contained in the following facts and figures, which show the value of the various commodities controlled by each Commodity or Marketing Board (the figures being those for the year 1927):—

| | £ |
|------------------------|-----------|
| Sugar-cane | 7,108,907 |
| Butter | 5,024,957 |
| Fruit | 1,915,079 |
| Cheese | 560,355 |
| Wheat | 1,040,486 |
| Cotton | 144,576 |
| Eggs | 274,740 |
| Atherton Maize | 165,326 |
| Arrowroot | *20,244 |
| Atherton Pig | 16,200 |
| Canary Seed | 11,109 |
| Peanuts | 108,662 |
| Broom Millet | 18,270 |

Total value £16,408,921

*Approximately.

Those figures indicate that a very large volume of agricultural production of Queensland is controlled by marketing boards exercising powers conferred on them by legislation passed in this Parliament. The value of agricultural production of the State, including dairying, poultry, and bee farming, for the year ended June 1926, amounted to £18,932,840. Of this amount agricultural products to the value of £14,770,936, or 78 per cent., were under the control of commodity or marketing boards. However, it may be said that in any one year approximately three-fourths of the annual value of the agricultural production of Queensland is marketed through the pooling system. The general policy has been uniformly successful from its inception. There is no single case of any marketing board having been unsuccessful in its operation, and all have been maintained on a sound financial basis. From time to time the Government has either made advances of credits to these boards or has guaranteed credits. In other cases financial institutions, without any guarantee from the Government at all, have provided them with the necessary fluid capital to carry on their operations. In every case these marketing boards have met their obligations, and not one penny of Government guarantee has been called up. All that indicates a very healthy state of affairs with regard to this form of policy, and justifies the Government in continuing this line of activity.

The Department of Agriculture and Stock provides expert field advice, and this is at the disposal of the farmer in every district of the State.

Favoured by Producers.

Further tangible evidence of the confidence of the producers in the pooling system is the fact that, when votes have been taken on the question of the continuance or otherwise of an existing pool, an increasing percentage is invariably noted in the number of producers for the carrying on of the pool concerned. For example, the several pools now operating have been adopted on the following majorities:—

Arrowroot, established in 1922 without any opposition.

Atherton Maize, established in 1923 without any opposition.

Northern Pig, established in 1923 without any opposition; renewed in 1926 without any opposition.

Broom Millet, established in 1926 without any opposition.

Butter, established in 1925 by a 75 per cent. majority; renewed in 1928 without any opposition.

Canary Seed, established in 1925 by a 75 per cent. majority; renewed in 1928 without any opposition.

Cheese, established in 1922 by a 91 per cent. majority; renewed in 1925 without any opposition; renewed in 1927 without any opposition.

Cotton, established in 1926 without any opposition.

Eggs, established in 1923 by an 87 per cent. majority; established in 1925 by a 73 per cent. majority; renewed in 1926 by a 66½ per cent. majority.

(That indicates a falling-off in the percentages of those in favour of pooling, which is often due to a greater number of poultry farmers being brought within the ambit of the pool.)

Peanuts, established in 1924 without any opposition; renewed in 1925 without any opposition; renewed in 1926 by a 90 per cent. majority.

Stanthorpe Tomatoes (superseded by Committee of Direction), established in 1922 by a 78 per cent. majority.

Wheat (under the Wheat Pool Act), established in 1921 by a 97½ per cent. majority; extended in 1924 by an 89 per cent. majority; extended in 1928 without any effective opposition.

It is of interest at this stage to refer briefly to the operations of the Sugar Board and the Butter Board, which can be regarded as having the control on the marketing side of two of the State's most important agricultural industries.

Butter Board.

This was constituted on the 19th February, 1925. It applies to the whole State, and the Government guaranteed the pool £600 for preliminary administrative expenses.

The Queensland Butter Pool controls the marketing of all butter sold within the State by fixing prices and licensing wholesale agents. It does not actually handle butter itself. The board practically acts as an accounting body, and particulars of the prices realised for butter by wholesale agents are conveyed to the Pool Board, who in turn adopt means for equalising (so far as export and local sales are concerned) the wholesale prices to factories throughout the State. The equalisation scheme adopted by the Queensland Butter Pool is worked in conjunction with the Commonwealth Patterson Scheme.

The operations of the Butter Pool Board have resulted in dairy farmers benefiting to the extent of £493,585 over and above the prices received by dairymen in Victoria, New South Wales, and London parity, as distinct from any material advantages that may have accrued as the result of the operations of the Patterson Scheme.

The Department is associated with the producers in further improving the conditions of primary industry in respect to marketing both at home and overseas.

Dairying.

As late as the year 1900 the quantity of dairy produce marketed in Queensland was insufficient to meet the domestic requirements of the population, but since that time this branch of husbandry has developed at a rate unequalled probably in any other part of the world. Twenty years ago there was not enough butter produced in this State to provide a cargo for a small coastal steamer on which a refrigerating plant had been installed with the idea of conveying Queensland butter to Sydney for transhipment overseas. To-day the largest ocean liners visiting the port of Brisbane load butter cargoes direct from the Departmental Cold Stores at Hamilton.

Moreover, Queensland butter has won and retains a most favourable reputation on the overseas market, and has frequently secured first place for quality in open competition with the world's butter-producing countries.

In twenty years, largely on account of the work of the Agricultural Department, dairying has developed into a national industry next to sugar in annual value.

In 1911 Queensland produced 27,800,000 lb. of butter and 3,718,257 lb. of cheese. In the year 1921 (taking the ten-year period) the production of both commodities rose to 60,900,000 lb. and 15,000,000 lb. respectively, and in addition 15,000,000 lb. of condensed milk were produced in the latter year. In the course of the decade production more than doubled. The latest figures are (1927-28)—butter 69,464,414 lb., cheese 14,009,606 lb.

The monetary value of the industry increased from £2,250,000 in 1911 to £7,250,000 in 1927. Fifteen years ago there was no appreciable production of cheese, but to-day, largely through the inspiration and energy of the Department, Queensland is now the biggest cheese exporting State in the Commonwealth.

The development of dairying is more dependent upon efficient team work than upon individual effort, and to achieve the extraordinary success outlined it was necessary for the producer, the manufacturer, selling agent, and Departmental officers to work together harmoniously, and of these the lastmentioned was not the least important.

The progressive dairy farmer realises that high producing cows increase profits and to this end he is co-operating with the Department in extending herd-testing operations.

The Dairy Cattle Improvement Subsidy Scheme is being availed of by dairy farmers, and through it the number of high-class sires among out dairy herds has been increased.

New Regulations under "*The Dairy Produce Act of 1920*" provide for higher technical training and efficiency of factory staffs.

The Department is now associated with the producers in further improving the conditions of the industry in respect to marketing both at home and overseas; applying modern methods to dairy practice and animal husbandry; and adding to the butter fat production of our dairy herds.

I want to give some figures with regard to the prices to farmers taken from the report of the Queensland Farmers' Co-operative Association Limited, for the year ended 30th June, 1928. The success of its operations can be regarded as typical of the progress that has taken place in the dairying industry in Queensland. The figures given in the return show the total amount of butter manufactured by the Association since its inception, the amount paid to its suppliers, and the average price paid per lb., all grades.

An analysis of the return indicates that for the period from 1902 to 1914 inclusive—a period of fourteen years—the average price per lb., all grades, paid by the Association to its suppliers ranged from a minimum of 7½d. per lb. to a maximum of 11½d. per lb., whilst from 1915 to 1928 inclusive—a period of fourteen years—the average price per lb., all grades, paid to suppliers ranged from a minimum of 1s. 1½d. per lb. to a maximum of 1s. 10½d. per lb.

Averaging the prices paid each year from 1902 to 1914, gives an average price paid during the period under review of 8.98d. per lb., whilst on the same basis, for the second period, from 1915 to 1928—under a Labour Government—the average price paid to suppliers amounts to 15.76d. per lb., or a direct increase in return to the dairy farmers of 77.5 per cent.

The Commonwealth "Year Book," No. 20 for 1927, comments thus on the expansion in recent years of the dairying industry in Queensland, and the influence such increased production has had upon the output for the Commonwealth as a whole—

"The marked development of dairying in Queensland, where the butter production has nearly doubled since 1913, was responsible for the largest share of the increased butter output in Australia, while Victoria and New South Wales also made important contributions to the general progress."

Queensland is the one country that produces cane sugar successfully by white labour. The industry pays more than six millions sterling annually in wages to White Australian workers.

The Sugar Board.

This Board does not come under the Pools Act. The Commonwealth Government relinquished control of sugar as from the 30th June, 1923, but agreed to a two years' embargo subject to the formation of a Queensland Sugar Pool. The Queensland Government acquired the 1923 season's sugar by proclamation under the Sugar Acquisition Act, and established an Advisory Board on which the Queensland Government, the Australian Sugar Producers' Association, the United Cane Growers' Association, and the millers had one representative each.

The Pool Board, which was constituted in July, 1923, took over from the Commonwealth the surplus sugar on hand at 30th June, 1923. It also completed arrangements with the refining companies for the refining and distribution (for Australian requirements) of the surplus sugar and the 1923 production. The Board was successful in obtaining reduced rates for the carriage of the raw sugar from Queensland ports to refineries. The Pool Board acts for the raw sugar millers collectively in connection with the refining and selling of the product, instead of the individual millers, as in previous days, making separate selling agreements.

The original two years' embargo against the importation into the Commonwealth of black-grown sugar was renewed in 1925 and again in 1928, and will be in operation until August, 1931, to which date the Sugar Board's appointment was also extended.

The Sugar Industry.

Queensland is the one country that grows sugar-cane successfully by white labour, under white labour conditions. The industry pays more than six millions sterling annually to white Australian workers. Sugar has been an important factor in building up other industries, the export of which amounts to £17,000,000 annually.

The industry employs over 20,000 people and more than 100,000 persons are dependent upon it. The capital invested in it amounts to £16,000,000 exclusive of working capital.

In 1871 there were only 9,581 acres under cane. In Queensland to-day the cane area is well over 200,000 acres.

In 1914 sugar-growing was a struggling industry. It is now one of the most efficient in the Commonwealth. In 1914 the tonnage of sugar manufactured was 225,847. The average annual tonnage of sugar manufactured for the last two years reached over 400,000 tons.

This extraordinary development in this one industry alone was due in a very great measure to the organisation, inspiration, support, and continued encouragement of the Queensland Agricultural Department. Sugar Experiment Stations have been established in the several cane-growing districts, and scientific agricultural principles, relating principally to plant breeding, selection, fertilisation, and cultivation, are being applied widely and successfully by officers of the Agricultural Department.

All the machinery possible for thorough organisation and distribution and marketing of primary products has, largely through the Department of Agriculture and Stock, been placed at the disposal of the Queensland farmer.

OTHER DEPARTMENTAL ACTIVITIES.

Farmers' Wool Scheme.

The Farmers' Wool Scheme is being used by very many more of the smaller holders this year than ever before. There were rarely 100 bales in the store before Christmas, but this year there are many more bales of finished wools in brokers' hands, and remaining to be handled. The greater quantity consigned to the Department has always come in the New Year.

Sheep on the coastal areas are increasing in numbers and sheep-raising there has gone considerably past the experimental stage. The services of Departmental instructors in sheep and wool are at all times available to the small flock owner.

Pig Raising in Queensland.

Pig raising is an important industry, particularly in those districts in Southern Queensland in which dairying and mixed farming are carried on, and on the Darling Downs and other wheat-growing areas.

On the Atherton Tableland.

The industry is becoming of importance on the Atherton Tableland and the Cairns hinterland districts, and in both Northern and Central Queensland. The Northern Pig Board, controlling the marketing in the important pig-raising areas of the North, functions satisfactorily, and now that the Board has been granted an extension of time over which to organise the marketing of all available pigs, success in this industry is assured. There can be no doubt that the organisation of the industry in the far Northern districts and the establishment of the farmers' own co-operative bacon factory has placed the industry on a permanent basis, and has assured for the producer a reliable market outlet for all the pigs he cares to make available for handling by the Board. This permanence, and the fact that the Board has been able to finance satisfactorily and return to the producer payable prices, has meant a rapid increase in the number of pigs produced, and it is safe to say that at no previous stage in the history of the Atherton Tableland have matters been so satisfactory and prosperous as they are in the pig-raising industry there to-day.

Stud Pigs at the State Farm, Kairi, Atherton Tableland.

The State Farm at Kairi continues to produce, and make available to farmers at reasonable prices, stud pigs of the Berkshire and Tamworth breeds. Visitors, especially farmers, are always welcomed and are given every facility for inspecting the stock and the operations of the farm.

The Bacon Business.

Though this industry, in common with many other agricultural industries, suffered a severe set-back as a result of the long-continued dry spells during 1926-27, conditions are rapidly returning to normal. The whole of the eight bacon factories operating in Queensland now report an increasing supply of better quality prime-conditioned bacon pigs, with good prospects for a continuance of supplies.

Fresh Pork Trade.

There is also an increasing demand for fresh pork both for local consumption and for export. Several of the meat export firms have engaged in the export of frozen pork with satisfactory results. This is a branch of the business well worth fostering, for there are extensive markets overseas for pork products. Indeed, the export of bacon is under consideration by various factories throughout this and other States.

Australian Pig Industry Council.

The prospects ahead of the pig industry, and the need for investigation into the conditions ruling on the local and overseas markets, has led to the formation of the Australian Pig Industry Council and the Queensland Pig Industry Committee, on both of which Departmental officers have a seat. These committees are composed of delegates representative both of producing and manufacturing interests, as well as of State and Commonwealth Departments, and are charged with the responsibility of co-operating wherever and whenever possible in an endeavour not only to extend local markets and production but to foster the export trade and place the industry on a more permanent and lucrative basis. State committees also function in the other States.

Fruit.

In respect of legislation, the Fruit Cases Act has been discarded in favour of a new measure, "*The Fruit and Vegetables Act of 1927*," which is calculated to materially improve marketing conditions, both for the producer and purchaser.

The Diseases in Plants Act has remained unaltered, with the exception of additional proclamations prohibiting the transference of banana plants into areas in which diseases are not known to exist.

"*The Primary Produce Experiment Stations Act of 1927*," has for its object the establishment of experimental stations for the purposes of experimentation with the different fruit crops from practically all aspects, including varieties, cultural and manurial, fruit transport, &c., taking each fruit separately and commencing with bananas. Demonstration plots have been established and are still being conducted in respect to citrus, pineapples, and strawberries, where the methods of the Department are applied for the information of fruitgrowers generally.

Diseases in Live Stock.

The Department supplies large quantities of preventive vaccines to stock-owners, such as quantities of pleuro-pneumonia virus and blood for immunisation against redwater, blackleg vaccine, and contagious mammitis vaccine.

Active measures have been taken to prevent the further spread of the cattle tick into clean areas.

The inspection and registration of stallions is now being carried out by a Central and Southern Queensland Board. In time the effect of this legislation should be fully realised, as the inspections and examinations are for the purpose of preventing the carrying on of hereditary diseases, such as side bone, ring bone, and spavin.

The testing of dipping fluids is carried out free of cost to all owners of dips, so that the farmer can be assured of the strength of the solution he is using on his stock.

Strict measures are taken to ensure a healthy meat supply under hygienic conditions.

Poultry Raising.

Poultry raising still continues to increase in value in Queensland, and during the present year the oversea export of eggs has exceeded that of any previous season. Primary producers generally are giving more consideration to the keeping of poultry as an adjunct to their general farming operations, while the practice of commercial poultry farming has extended considerably.

There is no doubt that the existing marketing condition, made possible under the Primary Producers Pools Acts, is directly responsible for the development of this industry. It is estimated that approximately 3,000,000 dozens of eggs will be handled by the Pool Board and its agents during the present year, and it will readily be understood that the stability of the industry is only made possible by organised marketing of this large quantity in a city with a population of 275,000. Especially is this so when thousands of householders keep a sufficient number of birds, not only to supply their own requirements, but have a surplus which they usually trade with their grocer.

The Government is not unmindful of the possibilities of the industry, and have associated with the Department of Agriculture and Stock a Poultry Expert, and with the Department of Public Instruction a Poultry Instructor, while the Department of Public Lands has an attendant whose duty it is to attend to the large public hatchery at Mount Gravatt. In addition an Inspector of Poultry has been appointed, while provision has been made by the Department on estimates of this year for an assistant instructor.

Wheat.

Wheat-growing has received attention at the same time and the annual Queensland yield has reached as high as 4,000,000 bushels, worth over £1,000,000. Over a ten-year period, as a result of the activities of the Department and the investigations and practical work of its specialist officers, the average yield per acre has exceeded that of other wheat-growing States, excepting Tasmania, and the distinction of obtaining the highest average yield per acre (29.91 bushels) belongs to Queensland.

The results of wheat breeding and cultural tests by the Departmental officers are evident in improved milling tests and a wide range of newer varieties suitable to Queensland conditions. The Queensland wheat-grower is not a one-crop man, and he usually engages in diversified farming including lamb-raising, pig-raising, and dairying. In all these branches the scientific and specialist training of our field officers are at the disposal of the man on the land.

Cotton.

After the cotton collapse of the seventies small attempts to resuscitate the industry were made at different times; but these attempts were only spasmodic. In 1920 cotton growing in Queensland was little more than a mere memory. In that year the Department initiated a strong revival. It erected a cotton gin at its headquarters in Brisbane which enabled growers to have their seed cotton treated economically and prepared for market. The Department directed its energies towards re-establishing the industry on a sound basis. Protective legislation was passed. Specialists were engaged as demonstrators and instructors. It is a branch of agriculture that has been beset with many difficulties, but in face of them the Department has succeeded in placing it on a firm commercial basis, and under Departmental guidance it now shows every prospect of becoming an important and thriving source of agricultural wealth. This is evident in the definite result that, through it, much new wealth is added annually to Queensland. The industry is capable of almost limitless expansion and cotton-growing is coming to be regarded as a valuable subsidiary crop in many districts. Individual farmers, mostly growing small areas under cotton, now number 6,000. The industry is controlled by the Cotton Board which is elected by the growers.

DEPARTMENTAL ORGANISATION—A REVIEW.

The Department is organised along sound administrative, commercial, and educational lines. The several branches, each with a technical head and a staff of competent instructors and inspectors, cover every phase of farming from field work to scientific laboratory investigation. For experimental and practical demonstration work State farms, controlled by Departmental officers, have been established in selected districts. On these farms the breeding and propagation of cereals and other crops suitable to Queensland conditions, both temperate and tropical, strict stock breeding (cattle, horses, sheep, and pigs), irrigation, and every other branch of modern farm practice are carried out. In addition to their general utility, these farms are also designed as educational centres where the latest ideas of husbandry can be tested and applied. Extension of this work is provided for in experimental plots on selected farms in the several districts on which, with the co-operation of the farmers themselves, field crop trials are made, the results of which are recorded carefully for the general guidance, both of the Department and the farmers.

Sugar experimental stations have been established in the chief sugar-growing regions with the object of improving the quality of cane, testing values of, and demonstrating different methods of cultivation, and also for carrying out fertilising and other experiments. General scientific research is also an important feature of the activities of these stations. For investigating diseases and pests of sugar-cane a sugar investigation station has also been established. These stations are having a very big influence on the prosperity of the State's chief agricultural industry.

Stock Experiment Stations have been established in the Northern and Southern divisions of the State for the purpose of investigating stock diseases and keeping the farmers informed in respect to modern developments in animal husbandry in all its branches. Other Departmental activities cover horticulture in all its branches; grading, packing, transporting, and marketing all primary commodities; supervision of imports and exports of primary products, both in raw and manufactured forms; assurance of benefit to the farmer by the strict enforcement of the Fertilisers, Stock Foods, Pure Seeds, and other related Acts; making available to the farmer the technical and advisory services of the Agricultural Chemist and his staff; making available to stock raisers the services of an experienced bacteriological and veterinary staff, particularly in relation to stock pests and diseases; and administering the Brands Act, the Dingo and Marsupial Act, and the specific legislation affecting the agricultural industry in all its ramifications.

Another feature of the functions of the Department is a system of effective publicity. The "Queensland Agricultural Journal" serves as an effective vehicle for current, technical, and topical information on farm affairs and problems. Pamphlets on technical subjects by technical officers and advisers are regularly published. Queensland at work in the rural industries has been filmed effectively and released for exhibition at home and abroad, and all the latest methods of publicity and the discoveries of modern science are pressed into the service of the Department on behalf of Queensland farmers.

Organised marketing boards in Queensland have in every case met their obligations. Not one penny of Government guarantees has been called up. This indicates a very healthy state of affairs.

A highly-trained entomological and pathological staff deals with the problems of insect infestation and plant diseases affecting Queensland's internal economy.

A Co-operative Wool Classing and Selling Scheme operates under the Department for the benefit of the small sheep farmer. To sum up then the activities of the Department may be summarised as follow:—

Scientific—Technical and Instructional.—Employment of scientific investigators for special problems (blow fly, fruit fly, banana beetle borer, bunchy top, &c.). Agricultural chemistry in all its branches. Instruction in the field in every branch. Plant and live stock improvement, including:—Wheat-breeding and propagation plots, maize improvement, pasture improvement. Scientific investigation of animal and plant pests and diseases. Dairy and farm management. State studs—Horses, cattle, pigs. General crop improvement (cereals, forage, roots, vegetables, fruits, vines, and legumes). Testing of commercial and industrial plants (Cassava, &c.). Animal husbandry in all its branches. Fodder conservation.

Commercial.—Classing and marketing of farmers' wool clips. Formation of Primary Products Pools. Encouragement and financing of Farmer Co-operative enterprises. Extending the activities of the Advances to Settlers Board. Administration of Cane Prices Boards. Administration of Commodity Boards. Ensuring the supply to the farmer of pure seeds, stock foods and fertilisers. Controlling dairy produce from the pastures to places of shipment. Raising and maintaining high export standards. Exploiting and development of new markets. Assistance to Co-operative Butter Factories and other kindred enterprises. Guaranteeing cotton prices. Co-operating with the Commonwealth in marketing matters and other branches of agricultural economies.

Legislative.—By special and general legislation on the initiative of the Department the agricultural industry has been more or less stabilised. Rural legislative record in Queensland has been unequalled in any other State. In one session (1923) as many as twelve measures initiated by the Department relating to farming interests

were passed into law. Some of these measures have since been amended to provide for altered circumstances and to more effectively safeguard or extend the interests of the agriculturist.

All the machinery possible for thorough organisation and distribution and marketing of products has been placed, largely through the agency of the Department, at the disposal of the farmer.

Publicity.—Recognition of the value of appropriate publicity, particularly in relation to the marketing of products has been recognised in—Radio service, industrial films, free issue of Departmental publications.

General.—The practical recognition and supply of the needs of the agricultural industry in all its phases, the conservation of the rights of farmers to a fair and reasonable return for their enterprise, and everything else that will bring agriculture into line with the State's most profitable industries. Departmental success that is the result of a broad visioned policy, allied with administration in sympathy with its peculiar needs, is inextricably woven with the fortunes of the agricultural industry in Queensland.

Co-operative organisation, wisely managed and efficiently controlled, will reduce costs and ensure to the farmer a more equitable return for his energy and enterprise.

A POLICY FOR THE FUTURE.

I have indicated at some length the scope of the activities of the Department of Agriculture in its relation to the economic life of the agricultural industries of this State. We have provided all the necessary legislative machinery to assist in the extension of agriculture with a view to improving the condition of those engaged in primary production. Co-operative activity is the most significant social and economic factor in the life of the community to-day, and according to the manner in which it is developed and controlled so will the future of the various industries be determined.

It must be remembered, however, that in dealing with co-operative organisation the words "co-operative" or "organisation" of themselves do not confer any benefit. For any benefit to be conferred by a new form of organisation it must be more efficient than the form of organisation which it seeks to displace.

Marketing.

Co-operative organisation wisely managed and efficiently controlled, by eliminating waste in various directions, can reduce costs and enable a greater return to accrue to the farmer. By well-devised and orderly marketing gluts can be prevented, depressions guarded against, and in countless different ways orderly marketing or orderly supply of goods to a market can be of benefit to all concerned. Why should the farmer be the only individual who has no control over the marketing of his own product? Almost every other form of human activity that produces has some foreknowledge of the marketing conditions. The demand that there will be for a given product in a given market at a given time can be estimated with a degree of accuracy; and organisation can be so effected as to supply that market regularly with a view to preventing low prices and gluts from time to time.

Organisation and Orderly Control.

These are the days of organisation and orderly control; and if that organisation and control are carried out in a manner not detrimental to the public interest, it will be of distinct benefit to society. Most of the difficulties in the world at the present time are due to bad organisation in production and distribution. Where production exceeds consumption under a given form of organisation, periods of trade depression follow with resultant difficulties to all concerned. With modern methods and machinery, the productive power of mankind in industry has increased enormously. Production can be carried on with greater rapidity than consumption can overtake it; and, as a result, we have a cycle of recurring trade depression within a narrow ambit of social organisation. Therefore, the remedy is orderly marketing and orderly control of industry with a view to estimating and supplying human needs.

Better Conditions for the Farmer.

Orderly marketing by a scientific organisation, which can be established under the Primary Producers' Organisation and Marketing Act, will enable the farmers, provided they use it properly, to obtain better conditions for themselves, and by those better conditions better organisation, improving the conditions of the great mass of the people generally, and thus be of benefit to the nation as a whole. Gluts are no good to the farmers. They mean that, when he has large crops, either through bad organisation or bad marketing, he gets a very small price, and on some occasions no worth-while price at all. In other cases when values are high he has little or no produce to sell. Those methods are bad both for the farmer and for the people who consume his produce. Of course, climatic conditions cannot be completely controlled, but I am satisfied that, with the application of proper methods, many of these difficulties can be removed.

I look to the farmers and those interested in agriculture generally to be loyal to their own organisations, to help so far as is in their power to place them on a better and more stable footing; to elect leaders distinguished for their honesty of purpose, vision, and capacity, and to co-operate also in all the efforts that are being made by my Department to improve the standards of production and efficiency generally in industry.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING NOVEMBER, 1928 AND 1927, FOR COMPARISON.

| Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | | Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | |
|-------------------------|-------------------|------------------------|-----------------|-------------|----------------------------------|-------------------|------------------------|-----------------|-------------|
| | Nov. | No. of Years' Records. | Nov., 1928. | Nov., 1927. | | Nov. | No. of Years' Records. | Nov., 1928. | Nov., 1927. |
| <i>North Coast.</i> | | | | | <i>South Coast—continued:</i> | | | | |
| | In. | | In. | In. | | In. | | In. | In. |
| Atherton ... | 1.95 | 27 | 5.54 | 0.20 | Nambour ... | 3.87 | 32 | 0.64 | 6.87 |
| Cairns ... | 3.84 | 46 | 7.11 | 0.43 | Nanango ... | 2.61 | 46 | 3.22 | 2.56 |
| Cardwell ... | 3.97 | 56 | 9.43 | 0.77 | Rockhampton ... | 2.18 | 41 | 1.70 | 3.42 |
| Cooktown ... | 2.59 | 52 | 4.39 | 0.50 | Woodford ... | 3.21 | 41 | 1.69 | 4.87 |
| Herberton ... | 2.43 | 41 | 5.15 | 1.30 | | | | | |
| Ingham ... | 3.43 | 33 | 13.89 | 1.25 | <i>Darling Downs.</i> | | | | |
| Innisfail ... | 5.96 | 47 | 13.68 | 2.46 | Dalby ... | 2.66 | 58 | 2.70 | 4.41 |
| Mossman ... | 3.36 | 15 | 13.51 | 1.13 | Emu Vale ... | 2.67 | 32 | 1.09 | 2.75 |
| Townsville ... | 1.78 | 57 | 3.59 | 0.08 | Jimbour ... | 2.33 | 40 | 3.99 | 4.17 |
| | | | | | Miles ... | 2.40 | 43 | 2.25 | 3.45 |
| <i>Central Coast.</i> | | | | | Stanthorpe ... | 2.73 | 55 | 1.73 | 4.03 |
| Ayr ... | 1.64 | 41 | 3.96 | 0.69 | Toowoomba ... | 3.27 | 56 | 1.63 | 4.85 |
| Bowen ... | 1.27 | 57 | 3.49 | 1.07 | Warwick ... | 2.60 | 63 | 2.02 | 4.66 |
| Charlton Towers ... | 1.41 | 46 | 5.04 | 0.06 | | | | | |
| Mackay ... | 2.85 | 57 | 10.75 | 2.28 | <i>Maranoa.</i> | | | | |
| Proserpine ... | 2.72 | 25 | 6.53 | 1.66 | Roma ... | 2.07 | 54 | 1.52 | 2.59 |
| St. Lawrence ... | 2.22 | 57 | 5.29 | 1.89 | | | | | |
| | | | | | <i>State Farms, &c.</i> | | | | |
| <i>South Coast.</i> | | | | | Bungewongorai ... | 2.06 | 14 | 1.06 | 1.47 |
| Biggenden ... | 2.68 | 29 | 2.03 | 3.98 | Gatton College ... | 2.79 | 29 | 1.77 | 4.53 |
| Bundaberg ... | 2.53 | 45 | 1.49 | 5.28 | Gindie ... | 2.05 | 29 | 2.65 | 2.50 |
| Brisbane ... | 3.74 | 77 | 2.90 | 5.82 | Hermitage ... | 2.69 | 22 | 1.30 | 2.97 |
| Caboolture ... | 3.38 | 41 | 1.73 | 8.21 | Kairi ... | 1.82 | 14 | 6.14 | 0 |
| Childers ... | 2.68 | 33 | 1.51 | 3.73 | Sugar Experiment Station, Mackay | 2.53 | 31 | 6.87 | 3.15 |
| Crohamhurst ... | 4.37 | 35 | 0.91 | 7.23 | Warren ... | 2.96 | 14 | 4.17 | 1.70 |
| Esk ... | 3.24 | 41 | 1.68 | 6.87 | | | | | |
| Gayndah ... | 2.84 | 57 | 1.93 | 6.89 | | | | | |
| Gympie ... | 3.14 | 58 | 1.38 | 4.16 | | | | | |
| Kilkivan ... | 2.54 | 49 | 1.37 | 2.31 | | | | | |
| Maryborough ... | 3.10 | 56 | 0.91 | 3.86 | | | | | |

J. H. HARTSHORN,

20th December, 1928.

Acting Divisional Meteorologist.

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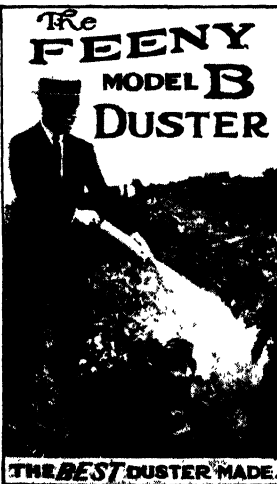
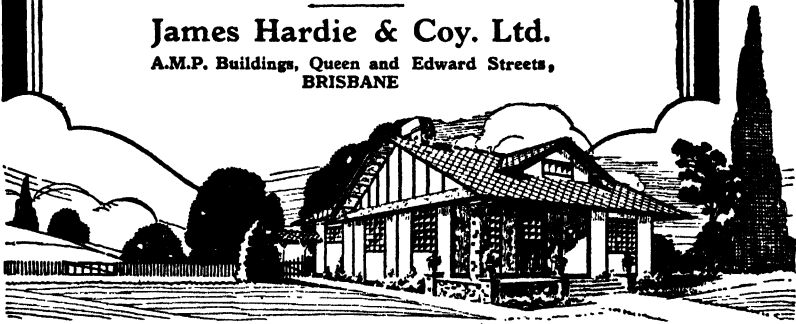
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A BUNDABERG EXPERIMENT PLOT.

An experiment plot on Mr. Knudsen's property at Bonna was initiated in 1926 at the request of the Branyan Farmers' Association. The area occupied is one acre, and is situate on the river bank. This was divided into four plots as under:—

Plot 1—Planted with cowpea, ordinary ploughing.

Plot 2—Planted with cowpea, and subsoiled.

Plot 3—Planted with cowpea, not subsoiled, but mixed manures applied.

Plot 4—No cowpea, manures, or subsoiling. (Check plot.)

The cowpea on plots 1, 2, and 3 was planted in October of 1926, and it was intended to plant the cane in March, 1927. Owing to the very heavy rain at that time planting had to be postponed till August of that year.

The following table shows the results:—

| Plot No. | Treatment. | Weight of Cane per Acre in English Tons. | Weight of Commercial Cane Sugar per Acre in English Tons. |
|----------|--|--|---|
| 1 | Ploughed four times to 10 inches and planted with cowpea | 40.30 | 5.39 |
| 2 | Ploughed four times and subsoiled to 18 inches; planted with cowpea | 42.11 | 5.60 |
| 3 | Ploughed four times to 10 inches and planted with cowpea and fertilised at following rate per acre, viz., sulphate of ammonia 200 lb., sulphate of potash 100 lb., and meatworks 300 lb. | 49.05 | 5.99 |
| 4 | Four ploughings only to 10 inches | 39.40 | 4.44 |

The results are extremely satisfactory, the cost of treatment not being excessive. The yield of the manured plot gave an increase of 9.65 tons of cane above the check plot (No. 4) for an expenditure for manure of £4 15s. per acre.

The work throughout was performed in a most competent manner by Mr. Knudsen and his sons, to whom the thanks of the Bureau are due.

QUEENSLAND'S PRINCIPAL INSECT PEST OF SUGAR-CANE.

The Entomologist at Meringa (Mr. E. Jarvis) has submitted the following report for the period, November to December, 1928, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

In these matter-of-fact days one is apt to disregard the air of seeming mystery or romance which invests or surrounds a big emergence of "greyback" cane beetles from fertile soils of the Cairns district, immediately after a tropical downpour during November or December.

The truth of those well-known lines "The poetry of Earth is never dead," finds, I think, abundant expression in such an appearance of insect profusion; when myriads of winged creatures responding to nature's magic touch, and being moved collectively, as it were, by some common but irresistible impulse, simultaneously forsake their subterranean pupal chambers, and hastily tunnelling upwards to the surface enter upon their brief aerial existence:—

"In wild abandonment 'mong mystic shades,
To court the golden hours, and taste the joys
Of that strange wonderland."

The metamorphosis of insects has long occupied the close attention of entomologists; but, although science is able to accurately figure and describe the differences in structure, form, and coloration of a species, and to some extent, through study of its internal anatomy, trace the final phases of transition or development from the pupal to the imago or perfect condition, we cannot explain how it happens that a lowly caterpillar, fitted only to crawl over and feed upon leaves or other food of a vegetable nature, should finally transform into a glorious honey-sipping butterfly attired in those rainbow tints or metallic colours which invariably excite universal wonder and admiration.

How different again, is our common cane grub, that lives for six or seven months in darkness underground, almost mechanically ingesting soil day by day in order to extract from it organic matter, or devouring the succulent roots of sugar-cane and other plants; how unlike it is to the well-known "greyback" cockchafer of our forest lands, which is equally at home whether tunnelling in the damp soils or flying around its various feeding-trees.

Some people would have us believe that the age of miracles is past, although, on the other hand, it has been stated by Lord Avebury that "our very existence is a miracle in itself." Certainly, to the true scientist or lover of nature, the life-cycle changes and complex metamorphosis of the cockchafer in question—one species only out of considerably over ten thousand beetles recorded from Australia—appear truly miraculous; while economic investigation regarding its habits and æcology during the larval and adult stages of development, coupled with such problems as its inter-relations with other insects, biological control, and a study of the various artificial remedial measures likely to prove effective against this serious cane pest, open up an almost inexhaustable field for scientific inquiry.

In America, owing to the number of economic entomologists available, it has been possible to estimate approximately the extent of financial losses due to the ravages of primary insect pests. It is thought that about 10 per cent. of every crop is probably destroyed by insects. "It would be within the statistical truth," says Folsam, "to say that it costs American farmers more to feed their insect foes than it does to maintain the whole system of education for everybody's children"; while the annual loss occasioned by insects amounts to nearly twice as much as it costs to maintain the American army and navy.

Such a statement should make Australians realise the supreme importance of enforcing strict quarantine supervision, with a view to preventing as far as possible the disastrous introduction into this country of certain notoriously destructive insects.

Regarding the economic status of our "greyback" cockchafer, I may state that, unlike several closely-related scarabæidæ occurring in other countries (genera *Lachnosterna* and *Melolontha*) which have a life cycle of from two to three years, the life of our Queensland species *Lepidoderma albohirtum* Waterh., from egg to adult beetle, is completed in twelve months.

It is probably due to this fact, coupled with the large size and voracity of its grubs, that we must attribute those capabilities for destruction which during seasons of normal rainfall have enabled this insect to take first place as a pest of cane. The importance of systematic action, however, when attempting to combat such insidious foes as the larvæ of cockchafer beetles has not yet been fully realised by our farmers; many of whom, who would not dream of neglecting to manure their crops at the right time, still continue to postpone treatment for cane grubs until signs of injury are apparent, and it has become too late to remedy the evil.

Emergence of Cane Beetles in the Cairns District.

Since reporting last month that "greybacks" had appeared on the wing about 14th November, a very decided emergence of this cane pest has occurred; beetles having been much in evidence around Meringa, Kamma, Gordonvale, Higgleigh, &c., where the numbers of beetles on feeding-trees have exceeded previous emergences noticed during the last few seasons. At the present time (11th December) plenty of specimens are still on the wing, although egg-laying has been proceeding since about the 3rd December.

Proportion of Sexes during Aerial Existence.

Data obtained by collecting several hundred specimens from food-plants growing close to the Experiment Station showed that on 19th November (about a week after emergence of these beetles) 60 per cent. of those captured proved to be of the female sex; while out of a collection of 323 beetles made the following day (20th November) 198 were females. Nineteen days later (3rd to 10th December) an additional 400 "greybacks" yielded a percentage of 43 females, indicating that the period of oviposition was in progress.

Beetles Attracted to Electric Light.

On 29th November, a beetle-trap designed a few years ago by the writer, was fitted with an electric lamp of 32-candle power in order to see if such form of illumination would prove as attractive to these insects as acetylene light.

This trap was placed close to a "Weeping Fig" tree (*Ficus Benjamina*), on which a number of "greybacks" were feeding. In less than two hours eighty beetles were captured, forty-one of which proved to be females.

It was found by experiment that setting the lamp in a concave reflector of about 8 inches diameter did not, apparently, make the light more attractive.

FIELD REPORTS.

The Northern Field Officer, Mr. A. P. Gibson, reports on the Mossman cane areas, inspected from 7th to 20th November, as follows:—

MOSSMAN.**Rainfall.**

| | | | | | | |
|-----------|----|----|----|----|----|-----------------|
| January | .. | .. | .. | .. | .. | 8.65 |
| February | .. | .. | .. | .. | .. | 37.14 |
| March | .. | .. | .. | .. | .. | 14.84 |
| April | .. | .. | .. | .. | .. | 2.91 |
| May | .. | .. | .. | .. | .. | 1.25 |
| June | .. | .. | .. | .. | .. | 0.40 |
| July | .. | .. | .. | .. | .. | 1.07 |
| August | .. | .. | .. | .. | .. | 0.34 |
| September | .. | .. | .. | .. | .. | 0.14 |
| October | .. | .. | .. | .. | .. | 0.51 |
| November | .. | .. | .. | .. | .. | 11.21 (to 20th) |

It will be seen that the fall to date has been badly distributed. Available past annual rainfall sheets showed that the November fall was the greatest for many years.

1928 Crop, its Harvesting and Milling.

The season commenced on 12th July and finished on the 1st November. Though the area cut was less, the tonnage harvested per acre was greater than that of the previous year. The crop in quantity and quality was short and sweet. Prolonged dry weather fully ripened the crop and enabled harvesting and milling operations to proceed uninterruptedly. However, it stayed the crop growth, and aided the pests, and brought about diminished yields and increased harvesting costs. Practically the whole crop was fired prior to its harvesting. As the cane was erect more per man per day was cut, therefore the factory was fully supplied all the time. All past milling records, such as crop sweetness, tons milled per week, tons sugar manufactured per week and season, were eclipsed. The crop was estimated at 80,000 tons; 78,542 tons were milled, yielding approximately 11,700 tons of sugar. The mill average c.c.s. was remarkably high, being 15.53 per cent. The major varieties milled were H.Q. 426 and Badila. The mill could comfortably crush another 20,000 tons, and it would not be impossible to make up the deficiency on the sugar lands at present growing cane by better farming, drainage, and judicious fertilising.

The New Crop.

Timely rain has improved wonderfully the 1929 crop prospects. The early planted cane had germinated favourably. Farming methods, though good in some instances, are not what they might be. The fruits of good and timely tilling may easily be detected. Some fields had not been touched since harvesting, small wonder poor crops are cut.

Planting.—Planting was under way. The soil had not been too well prepared. The seed used for the greater part was poor. Lack of rain at the end of the season compelled most farmers to harvest all cuttable cane, hence the difficulty in procuring seed. Not a few farmers filled the plant cane gaps by transplanting cane stools. It should always be seen that these are disease-free. Transplanting may be successfully accomplished during a wet sunless period.

Manuring.—Different manures, different rates, and different application methods were noted. It is not feasible that the popular mixtures used are suitable for all our different canes and soils throughout Queensland's sugar-growing belt. Fertilisers are not always applied as early as they should be. It should be remembered that cane growth once lost cannot be recovered, therefore it is desirable to fertilise early so as to force the early growth along. By so doing the interspaces are covered in a quicker time, evaporation is checked, and weeds suppressed; also the cost of production is reduced.

Pests and Diseases.

Heavy nightly flights of beetles, commencing about 7 p.m., were noted. Numerous emergence or descending holes were found in most fields. Wireworms were damaging primary plant cane shoots. Army caterpillars were noted devouring the cane foliage in isolated parts. Rats were eating newly forming cane, also the perished stems lying about the fields, suggesting they are hungry and that now is the right time for poisoning. Heaps of cane cut to seed prior to the rain, and covered with trash, were damaged by this pest.

Diseases noted were Leaf Stripe, "Jump Up" or Downy Mildew, Leaf Scald, and Mosaic. Leaf Stripe, the major disease, though very bad in parts, is becoming less. Mosaic was found in the variety B. 156 growing at Saltwater.

DAINTREE.

A brief inspection of the Daintree was made; the natural beauty of the river would be hard to surpass. The river banks are scrub covered, the land slopes back in places to great swamps. What could be seen of the soil was good. It is said there are 4,500 acres of good land blessed by a 100-inch rainfall. Already there is a butter factory at work on the upper reaches, and surrounding it is dairying land equal to the very best in Queensland.

QUEENSLAND FRUIT IN SYDNEY.

This interesting news item is taken from the Sydney "Evening News" (7th December, 1928):—

Fine specimens of tropical fruits were shown to the Housewives' Association at the Lyceum Club yesterday by Mr. P. J. Nally, of the Queensland Tourist Bureau.

Exhibiting a large pineapple, he said he had purchased it in King street for 4s., whereas in the Sydney fruit markets the same fruit could be purchased for 17s. a case. Mangoes, which were sold in Sydney for 1s. 6d. each, were sold in Queensland at £1 a case of nine dozen, and the prolific papaws, sold in our city for 4s. each, were fed to fowls.

The papaw, he said, could be utilised for making ointment, paint, chutney, as vegetable marrow, and as dessert. In addition to this, the wrapping of the leaf round tough steak would cause the meat to become deliciously tender.

To bring Queensland fruits within reach of Sydney people, many of whom did not know the flavour of the tropical products, Mr. Nally said that he hoped to establish a stall in the city.

He suggested that if the Housewives' Association bought sugar in bulk, say in ½-ton lots, it could be retailed to members, who would effect a saving thereby.

THE SPIRIT OF CHRISTMAS.

From the Queensland Cane Growers' Council to the Editor:—

"The spirit of Christmas calls to a better appreciation of the value of old friendships.

"We consider ourselves fortunate in being among those to wish you a Christmas of joy and contentment and an exceptionally happy New Year."

INSECT ANATOMY.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

The body of an insect consists of three very distinct regions each of which is composed of a number of segments. These three regions are the head, the thorax, and the abdomen, each of which can be clearly distinguished in such a common insect as the Queensland fruit fly or the ordinary house fly. The main anatomical features and functions of these various regions will now be dealt with in some detail.

The antennæ, the eyes, and the mouth parts are the most conspicuous features on the insect head. They all perform highly important functions in insect life, and, although impressions can be received by the insect through the agency of organs situated on different parts of the body, the impressions that are received by the organs situated on the head include the extremely important ones of sight, smell, touch, taste, and hearing.

The Antennæ.

The antennæ are a pair of very conspicuous jointed appendages which are situated on the head either between or in front of the compound eyes. The shape and size of these antennæ vary tremendously in the different families of insects, but although these variations are of great scientific importance their discussion is unnecessary in these notes. It may be mentioned, however, that not only do striking differences occur in the structure of the antennæ of different insects, but they may also be found in the two sexes of the same species—e.g., in mosquitoes the antennæ are very plumose or feathered in the male, whereas in the female they are pilose or clothed with down.

Sense of Smell.

It is generally agreed that the olfactory sense or sense of smell is located mainly but not necessarily exclusively in the antennæ. Definite evidence exists to show that in certain insects the sense of smell is wholly restricted to the antennæ, and if these organs are removed the insects lose the olfactory sense. It must be pointed out, however, that in some other insects the removal of the antennæ does not appear to be accompanied by the loss of the sense of smell, a fact that seems to indicate that the olfactory sense in these particular species is not restricted to the antennæ. Nevertheless it is probably correct to say that the sense of smell in the majority of insects is mainly if not wholly restricted to the antennæ.

The olfactory sense may perform several functions; it may enable an insect to find a suitable medium in which to place its eggs or maggots as in the case of the blowflies. In these the sense of smell is extremely acute, and has been admirably developed for the purpose of enabling the flies to locate their maggots food supply. A second function of the sense of smell is illustrated by the fact that it has been demonstrated that in certain moths the males find the females only by virtue of the olfactory sense possessed by the antennæ; when these organs are removed the males are no longer able to find the females for mating purposes. Thirdly, there is the relationship that exists between the sense of smell and the choice of food plants by female insects for the purpose of egg-laying or oviposition.

Perception of Sound.

The antennæ may also function for the perception of sound, a fact that is well illustrated in the case of mosquitoes. The antennæ of the male mosquito are very plumose, as a result of an extremely pronounced development of antennal hairs, and it has been experimentally demonstrated that these hairs may be set in vibration when certain tones are produced. It is argued that in this manner the male is able to locate the buzzing sound produced by the female and so can fly to it for mating.

It must not be assumed, however, that the sense of hearing in insects is confined to the antennæ. On the contrary, auditory organs are also known to occur on other portions of the body, including the legs and abdomen.

Sense of Touch.

The sense of touch is also well developed in the insect world, and, as in the case of the auditory organs, it is by no means confined to one region of the body, although it is believed to be particularly well developed in certain portions, included amongst which are the antennæ. Apart from those areas in which the tactile sense is exceptionally well developed, practically any other part of the surface of the body possesses the sense of touch.

The Eyes.

The eyes in the insect world are of two distinct types—firstly, there are the large compound or faceted eyes; and secondly there are the smaller simple eyes or ocelli. The compound eyes are clearly seen on each side of the head in such an insect as the Queensland fruit fly. An examination of these compound eyes by means of a hand lens will show that superficially they consist of an enormous number of very small areas or facets.

The number of facets in the compound eye is generally very large, being 4,000 in the case of the common house fly, as many as 25,000 in certain moths, while 28,000 have been recorded in some species of dragon flies. Exceptionally, there may be only a few facets, six to nine having been recorded in the worker caste of one species of ant.

The simple eyes are frequently absent in the adult insects, and in rare cases even the compound eyes may be missing. The simple eyes are generally the only organs of sight in immature forms of insects possessing a complete metamorphosis, such as caterpillars, but in internal parasites, such as small wasp larvæ, even these simple organs of vision are absent.

The discussion of insect eyes would be incomplete without a reference to the fact that frequently marked sexual differences occur in the eyes—e.g., in most flies the compound eyes in the male are appreciably larger than in the female.

Power of Vision.

With respect to the power of vision possessed by the two types of eyes just discussed, it is generally believed that through its compound eyes the insect is able to detect movements made by other animals or objects and also to recognise form. The power to detect movement probably extends to some considerable distance, but the perception of form is thought to be restricted to a few feet, probably six or seven. It is further believed that the simple eyes enable the insect to distinguish the form of objects in a crude manner, but such power is restricted to objects very close at hand. The simple eyes further enable the insect to distinguish light from darkness.

The Mouth Parts.

The mouth parts of many insects have undergone very profound modifications, and a number of distinct types of mouth may be observed even in the course of a very casual examination of some of the commoner insects. These varying types of mouth parts belong to the four following classes:—

- (1) Biting and chewing mouths.
- (2) Piercing and sucking mouths.
- (3) Biting and sucking mouths.
- (4) Sucking mouths.

Each of these types of mouth parts is worthy of some discussion.

Biting and Chewing Mouth.

The biting and chewing type of mouth is well represented by the grasshoppers and beetles. These insects feed by biting off and swallowing the tissue of the plants on which they live. The mouth parts have been modified to permit of this type of feeding, and the damage caused by these insects when attacking foliage or other tissue is usually very obvious.

Piercing and Sucking Mouth.

The piercing and sucking type of mouth is that possessed by scale insects, orange bugs, mosquitoes, and many other species of outstanding importance. In these insects the mouth has been so modified that certain parts thereof known as stylets function for the piercing of the skin, cuticle, or epidermis. Through the wound thus made the insect sucks out the blood or sap of its host animal or plant. The results of attacks by insects belonging to this class are not generally quite so obvious as in the case of those possessing biting and chewing mouth parts. Most people are aware, however, of the painful impression left by the attacks of sandflies and mosquitoes, and they also very frequently see leaves or young twigs of trees that have curled up and withered as a result of the attacks of aphids or plant lice. When plants are severely attacked by these insects the drain on their sap is frequently tremendous, and the plants are consequently stunted and sickly; in fact they not infrequently succumb to the attack in cases where the insects feeding on them are abnormally abundant. The importance of insects possessing this type of mouth is further demonstrated by reference to the fact that mosquitoes are responsible for the transmission of several very serious diseases of human beings.

Biting and Sucking Mouth.

The biting and sucking type of mouth is one that is found in the Hymenoptera, the Order to which the bees and wasps belong. In this type the mandibles and jaws are well developed for biting, but at the same time other parts of the mouth are so modified that the insect is also able to suck up liquid food. Insects belonging to the other three classes possess mouth parts that can either bite or suck, but this is the only class in which both these modes of feeding can be adopted.

Sucking Mouth.

The last type of mouth part to which reference has to be made is that of the sucking type possessed by butterflies and moths. The mandibles in most of the moths and butterflies are absent, and other parts

of the mouth have been modified so as to produce a long sucking tube through which liquids can be sucked up. Insects possessing this type of mouth are generally quite incapable of destroying plant tissue, i.e., when they are adults; of course, moths in their immature forms as caterpillars possess a totally different type of mouth and they are, in that stage of their life history, able to cause very serious losses. It has been said that moths are incapable of injuring plant tissue, and that statement in general is quite sound. There are, however, some exceptions, including the orange-piercing moths, which are quite important citrus pests.

The Thorax.

The thorax is the second or middle region of the insect body. It consists of three segments and typically bears two pairs of wings and three pairs of segmented legs in the adult stage. The second pair of wings in the flies, however, is represented by two small knobs known as halteres or balancers. Further exceptions occur in some families in which both pairs of wings are missing or rudimentary, sometimes in both and sometimes in one sex only. In other abnormal cases the wings may be restricted to a single pair in one sex only.

The Wings.

The first pair of wings is always situated on the middle segment of the thorax, the second pair being on the hind segment. When an insect possesses only a single pair of wings it is almost invariably the second pair that is absent. It has also been demonstrated that in some wingless insects (such as the flea) the wings have degenerated through lack of use, but in certain very primitive insects no trace of wings can be found even in the embryo.

The wings in many species such as the bees, wasps, dragon-flies, and flies are generally quite clear and membraneous. This is, however, by no means always so, for in the grasshoppers and their allies the front wings are distinctly leathery while in the beetles they are typically hard and horny. Again, in the moths and butterflies both pairs of wings are generally densely clad with scales which frequently give rise to extremely beautiful wing patterns. It is thus evident that the wings of insects are subject to very great variation.

Very powerful muscles, whose function it is to operate the wings, are situated within the external skeleton of the thorax. These may drive the flight organs at the rate of 330 strokes per second, as is the case with the house fly, or on the other hand they may produce the much slower rate of vibration that is typical of many common butterflies, only nine strokes per second having been recorded in certain species.

The Legs.

The insect leg consists typically of five segments, the last of which is itself usually composed of five parts of varying size. This terminal segment of the leg usually bears two claws and is also frequently furnished with a pulvillus or pad. The pad is typically adhesive and is generally held to be responsible for the power that flies and other insects possess of being able to walk on ceilings and on the undersides of leaves, &c., in an inverted position.

Legs occur in the great majority of adult insects, but in their immature stages legs are by no means invariably present—e.g., many beetle larvæ and most hymenopterous larvæ are legless, and the legless condition is the rule in the larvæ of flies.

The legs function primarily for walking or running but they are frequently modified for other purposes—e.g., in certain species the fore legs have been so altered in structure as to be suitable for burrowing, while in some species they have been adapted for seizing other insects. The hind legs in certain species have been abnormally developed so as to permit of jumping or leaping for considerable distances.

The Abdomen.

The abdomen, which constitutes the third region of the body, consists of a series of segments that exhibit comparatively little variation. Perhaps the most conspicuous external features of the abdomen are those associated with reproduction, for in the females of many species an ovipositor or egg-laying tube is distinctly visible.

Respiration.

Respiration in the insect world takes place through a system of air tubes or tracheæ, which ramify throughout the whole of the body, and in this way carry oxygen to the various tissues and organs. The openings in the body wall which permit of air entering the tracheæ are known as spiracles or stigmata. These occur in pairs on the thorax and abdomen and are generally situated laterally. Special provision for respiration is made in the case of the larvæ of aquatic insects, the special organs developed to meet the unusual conditions being known as gills.

Reproduction.

The normal procedure of sexual intercourse is generally necessary for reproduction in insects, and the sexual act is typically followed by the laying of fertilised eggs. To this generalisation there are, however, quite a number of exceptions, for many insects are viviparous—i.e., the females do not lay eggs but give birth to living larvæ or nymphs. The eggs are produced within the body of the female, but they are retained therein until the incubation period has been completed; the maggots or nymphs that have hatched are then extruded by the female. Many aphids and scale insects are viviparous as also are many species of flies.

A further point worthy of note in connection with insect reproduction is the fact that occasionally reproduction can take place without sexual intercourse. This phenomenon is known as parthenogenesis.

NO FARM HOMESTEAD COMPLETE WITHOUT THE JOURNAL.

A Gatton farmer, in renewing his Journal registration for another term, writes (17-12-28):—

"No farm is complete without its chooks, and no farmer's homestead is complete without the Journal."

SUGAR-CANE GROWING IN QUEENSLAND.

Sugar-cane is grown in Queensland on a long but fairly narrow coastal strip, extending over 1,000 miles in length, lying between latitudes 15 and 28 south. Parts of this belt are separated from each other by tracts of non-sugar country, and the latter, due to deficient rainfall or poorness of soil, are not utilised for cane. The bulk of the staple is grown within the tropics.

It is the State's largest agricultural industry, the total area under cane approaching 300,000 acres, the number of farmers engaged in it being 7,300. It gives employment to 28,000 men, and the wages paid amount to £6,000,000 per annum. It probably pays the highest wages of any agricultural industry in the world, and is the only cane-sugar producing country which carries on the growing and manufacturing of sugar by white labour. Directly and indirectly, the industry employs some 100,000 persons.

The growing of sugar-cane is essentially a small farmer's industry.

The number of raw-sugar mills in Queensland at the present time is 35, the latest addition being the fine Government sugar factory in the Tully River district, North Queensland. The erection of this mill has caused a large settlement to come into being, with schools, banks, stores, picture shows, &c., where only six years ago a dense tropical scrub existed. The cost of a new sugar-mill such as the Tully was between half and three-quarters of a million pounds—that is, to erect and equip with tramlines. There are also two refineries—one at Bundaberg and one at Brisbane.

The large towns of Cairns, Innisfail, Ingham, Ayr, Mackay, and Bundaberg are almost entirely supported by the Queensland sugar industry, and many other thriving townships are absolutely dependent upon it.

The State Government, naturally, takes a very keen interest in this great industry, and the price paid for sugar is the outcome of negotiations by the State with the Australian Federal Government. In order to protect farmers, the Sugar Cane Prices Acts were passed, and the grower has a voice in the fixing of the price for his product. Another result of the care given by the Government to the industry is the great reduction (nearly 2 tons) in the average weight of cane required

to make 1 ton of sugar. This is largely due to the introduction of better varieties of cane, more careful cultivation, better mill work, and organised instruction.

This article is intended to help growers in securing greater efficiency in the cultivation of cane, and so to reduce their costs of production; also to be of assistance to intending sugar-growers who desire to purchase cane farms.

The sugar industry has increased the population of North Queensland by over 30 per cent. in recent years.

There are many persons in Queensland who have purchased cane farms without any great knowledge of canegrowing, while many others frequently apply to the Department of Agriculture for information on the subject. The main points upon which information is sought are in relation to what might be termed the economics of the cane farm: What amount of capital is required to buy a farm? What working plant is needed? And what will be the return per acre?

In the present condition of the sugar industry it has, first of all, to be recognised that no Crown land is at present available for sugarcgrowing, so a would-be cane farmer must purchase a farm which has an assignment to an existing mill, or else lease such a farm.

It may be pointed out that the average size of a cane farm in Queensland is 36 acres, the largest farms being in North Queensland. The following table shows the average size of farms from Cairns to the Logan River district:—

| | |
|--|-----------|
| Cairns to Townsville | 48 acres. |
| Townsville to Mackay | 43 acres. |
| Bundaberg, Childers, Maryborough, &c. .. | 27 acres. |
| Maroochy to Logan | 9 acres. |

It will, therefore, be seen that the smaller farms are in the southern part of the State, where many canegrowers take up the growing of other crops or go in for dairying as a side line. In North Queensland canegrowing is the sole occupation of the cane farmer, and the high price of property in the belt of land from Ingham to Cairns compels his whole attention to making a living from cane alone.

The greater part of the farms in the Tully, South Johnstone, Babinda, and Innisfail cane areas were originally under scrub which was of a heavy nature.

In North Queensland, the buyer, when purchasing farms which have been developed from scrub lands, should select those with a good depth of soil. Light red soils on ridges should not be taken in preference to

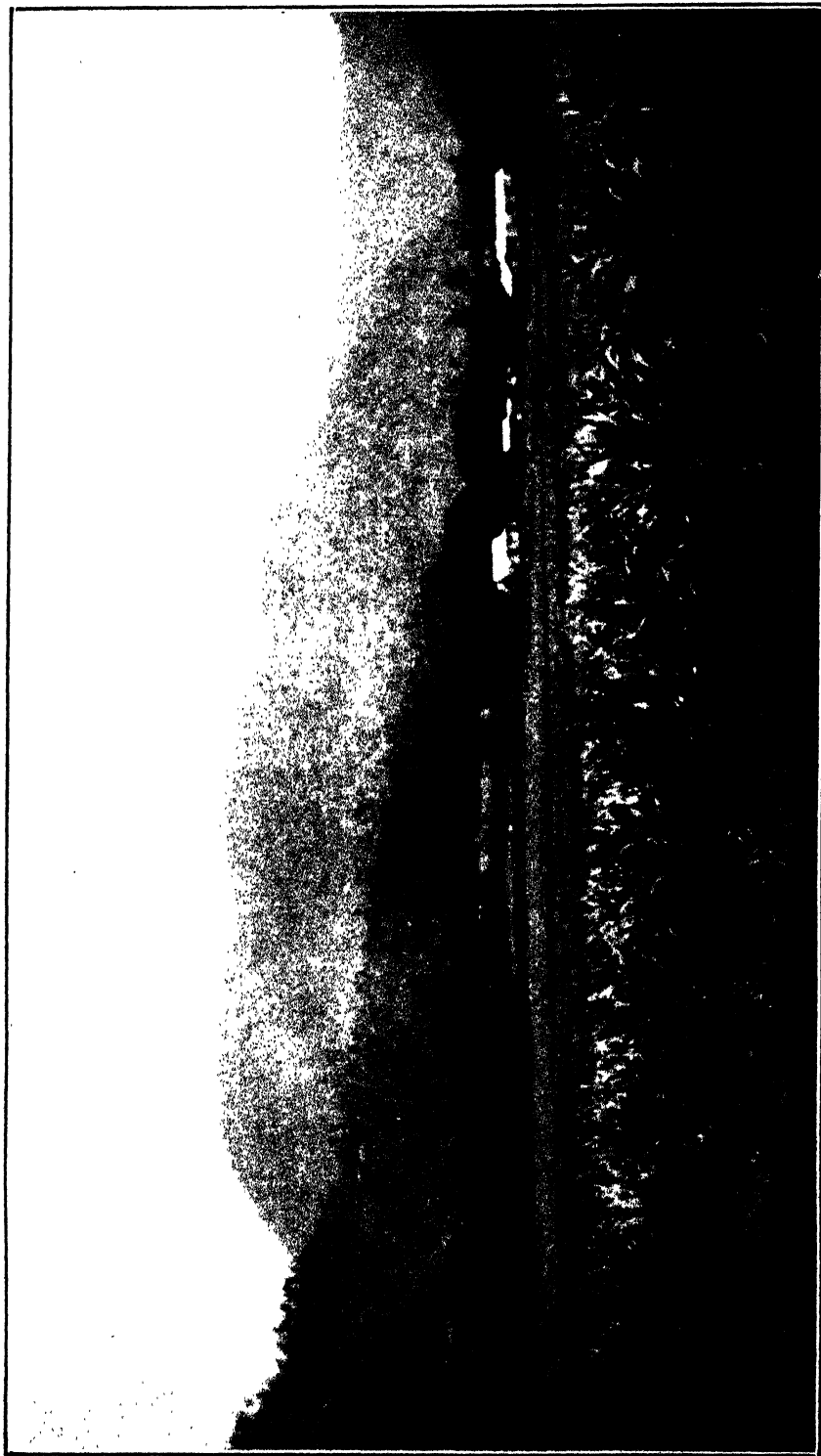


PLATE 3.—CANE FARMER'S HOMESTEAD AND CROP NEAR REDLYNCH, CAIRNS RAILWAY.

dark chocolate soils of level formation. The high cost of clearing these dense scrubs renders the price per acre of land under cane much higher than forest soils.

Southern scrub timbers are lighter in character than the northern ones. The nature of the soil on the farm and its depth and colour should be carefully ascertained before purchase.

As a general rule, the rich red volcanic soils that have carried scrubs, such as the Woongarra sub-district of Bundaberg, and the famed Isis (Childers) scrubs, are the best cane lands in southern Queensland.

Farms on forest lands are generally cheaper in price. The best of these soils for sugar-cane in North Queensland originally carried Moreton Bay ash (or Blackbutt, as it is sometimes called), acacia, and cocky apple. Other forest country had ironbark, bloodwood, poplar gum, cabbage gum, blue gum, tea-tree, wattle, &c. Southern forest lands grow a good many of these trees, though not much poplar gum. Country covered entirely with poplar gum is usually shallow, with a stiff clay subsoil, and should be avoided for canegrowing.

It may happen that improved farms offered for sale have a portion still under scrub or forest, and the cost of clearing and planting such an area when required for cane has to be taken into account. The following gives the approximate cost of this work on northern scrub soils according to location, kind of scrub, and nature of burning:—

Brushing, felling, burning, logging, and reburning—£12 to £17 per acre.

Holing for cane plants—3s. 9d. to 4s. 6d. per hundred.

Plants—£3 to £4 15s. per acre.

Labour-planting—£3 to £4 15s. per acre.

Chipping—£5 to £12 per acre.

In many of the Northern scrubs, the cost of felling, lumping, burning, holing, making roads, planting, and fencing have been given from £33 to £50 per acre. Grubbing and stumping have been taken to cost from £8 to £25 per acre, according to the timber.

In the Southern districts the cost of planting cane on the lighter scrubs would be much smaller, and has been set out as under:—

| | Per acre. | | |
|--|---------------|----|----|
| | £ | s. | d. |
| Brushing, felling, clearing, lumping, and burning .. | 3 | 10 | 0 |
| Holing | 2 | 10 | 0 |
| Plants | 2 | 10 | 0 |
| Planting | 2 | 0 | 0 |
| Chipping three times | 4 | 10 | 0 |
| | <hr/> £15 0 0 | | |

Scrub lands, after carrying from three to five or more crops, are then usually stumped and put under the plough.

Forest lands are nearly always completely cleared—i.e., they are at once stumped and put under the plough. The cost of clearing forest land varies a good deal, and may run into as much as £17 per acre in North Queensland and from £5 to £10 per acre in Southern Queensland. The cost of breaking up, further cross ploughings, and planting of cane would be additional.

The sugar industry employs 21,000 men in the cane fields and 7,000 in mills and refineries.

Purchasing Improved Farms.

When setting out to purchase an improved cane farm, the intending buyer should make detailed inquiries as to the value he is going to get for his money. The officers of the Bureau of Sugar Experiment Stations, attached to the Department of Agriculture and Stock, are at all times ready to give information and advice on the matter. The managers of the sugar mills to whom the farmers supply cane will always be found willing also to give information and advice. Always see that the cane land is properly assigned to a sugar mill, that the cane crop and improvements are worth what is being asked, and examine the soil and surroundings carefully, the latter particularly with reference to economic transport to the sugar mill.

The price of land varies considerably according to the location of the farm, from about £20 to £130 per acre. The lower priced farms are situate in Southern Queensland, where the yield per acre is usually not so high, and where the crops take longer to grow. The high-priced farms are mostly in North Queensland, where the returns are regular and droughts are practically unknown. These lands are all improved, and the improvements consist of the cane crop, team of horses, necessary implements, residence, and stables. The climate in North Queensland is a good one. The mills are modern and efficient, and are amply provided with tramlines and locomotives for carrying in the crops. The adjacent townships are provided with post and telegraph offices, schools, medical men, hospitals, &c.

Queensland is the only country growing sugar-cane by white labour. The sugar industry is the mainstay of the White Australia policy.

The more capital a man has the better chance he possesses of doing well rapidly. The smallest amount of capital a man would require would be £500 to pay a deposit and carry on, but if he were buying a cane farm about Innisfail, Babinda, or Cairns £2,000 would be much better to enable him to pay a fair amount of deposit and have some capital to carry on until his crop came in.

The following could be stated as the basic equipment for a small improved cane farm, apart from the cane crop:—

Buildings.—Residence, implement shed, stables, and chaff-cutting shed.

Implements.—Single disc plough, 28-inch, 3-horse swing plough, light 10-inch ratooning plough, Planet Junior scuffer, disc harrow, tine harrow, and roller.

Power.—A 3½-h.p. oil engine, chaffcutter, and sawbench.

Stock.—Three good draught horses or tractor and saddle hack. Two dairy cows are also desirable.

Miscellaneous.—Sulky or car, oils, benzine.

Tools.—Hoes, spade, shovel, pick, axe, files, cane knives, and set of carpenter's tools.

Equipment would vary according to the size of the farm purchased.

In addition to the cost of the farm with its improvements, the purchaser must be prepared for rates, taxes, interest, depreciation in buildings, implements, and stock, levies, assessments, wages, repairs, fuel, &c.

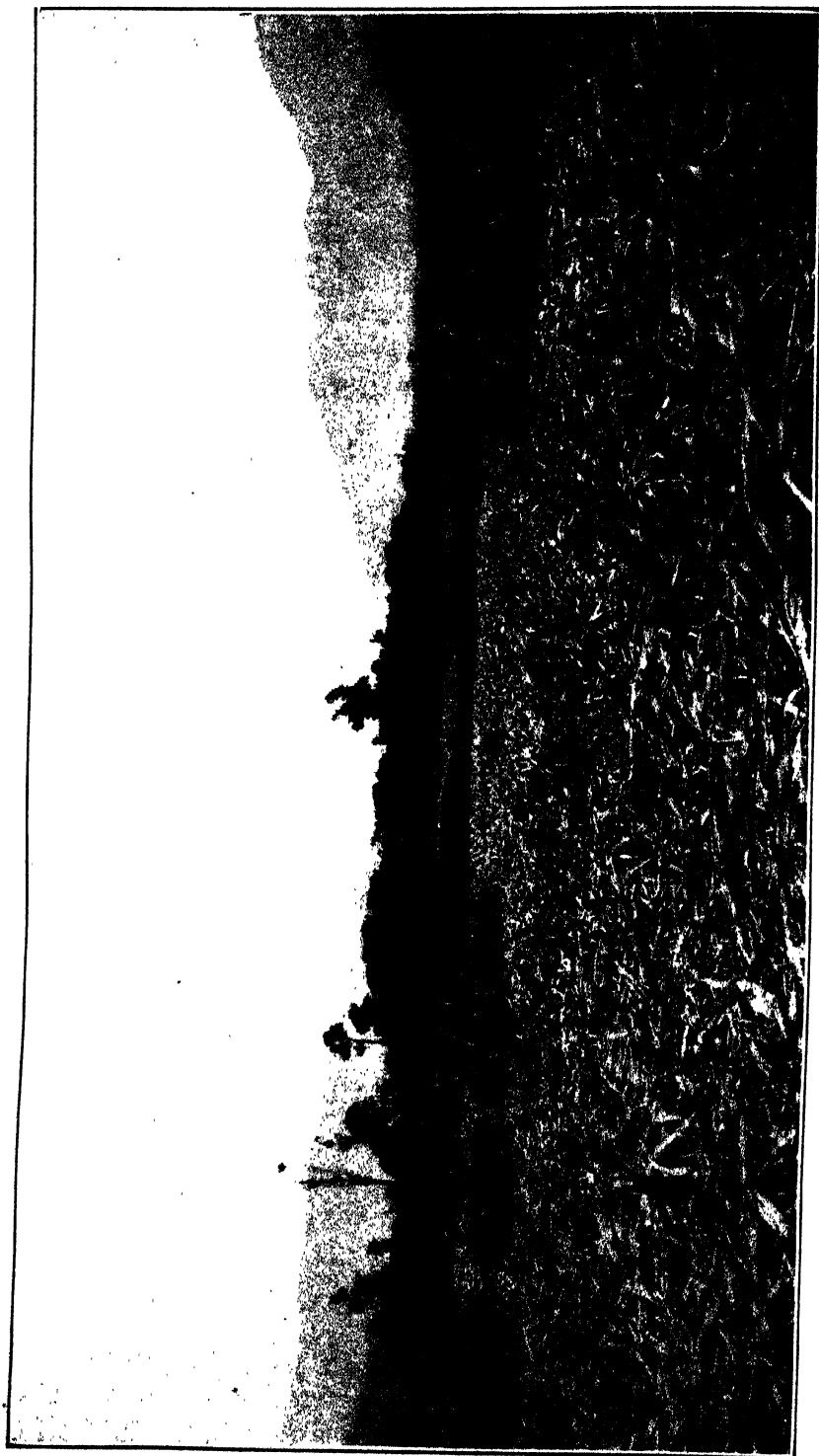
Cultivation of Cane.

The foregoing remarks are intended for new growers who wish to enter the industry; the following are for the benefit of canegrowers already in sugar-growing as well as for those commencing, and apply to land under the plough, as the greater part of the cane lands in Queensland come under this category, especially in the older areas which have been growing cane for many years. In the following districts either the whole or the greater part of the canegrowing lands are under the plough:—Logan, Maryborough, Isis, Bundaberg, Mackay, Proserpine, Lower Burdekin, Herbert River, Innisfail, Mulgrave, Hambleton, and Mossman.

For the purpose of ploughing out stools, a disc plough, either double or single, is generally used, and the discs should be particularly sharp so as to cut up the stools as much as possible. A few farmers make a practice of carting away the old stools, and if the time and labour can be afforded it is often wise to do this, as it gets rid of any disease and borer. It is, however, recognised that there are many difficulties in the way of carrying this out, and, if it is not practicable, the stools should be cut up so as to secure their quicker disintegration.

Liming.

Some cane lands require lime. This can generally be ascertained from an analysis of the soil, which is carried out free of charge to sugarcrowers by the Department of Agriculture and Stock through the Sugar Bureau. As a general rule, lime is required in most of the areas above



(Barile Free Mount.)

PLATE 4.—FROM FIELD TO MILL.—LOADING CANE TRUCKS ON DR. KNOWLES'S FARM, NEAR BAHINDA, NORTH QUEENSLAND.

Townsville, while below it the application of lime has not been found particularly payable.

Lime is usually applied to the soil in the following forms:—

- (a) Burnt lime or lime oxide.
- (b) Air-slaked lime—i.e., burnt lime that has been allowed to gradually slake in the air, and which ultimately becomes lime carbonate.
- (c) Water-slaked lime (lime hydrate).
- (d) Pulverised limestone (lime carbonate).

Burnt lime is the most valuable form for sweetening soils and producing alkalinity, especially on our Northern canefields, where the rainfall is great and the humus plentiful. It is, however, hard to obtain in a fine condition, and is disagreeable to handle. By air-slaking, however, it soon crumbles into a fine powder, which gradually turns into lime carbonate—a milder form of lime. This can be easily applied, and is recommended where a quick action is desired.

Ground or pulverised limestone is also very useful, but its action is comparatively slower.

The Relative Value of Different Forms of Lime.

Fifty-six pounds of fresh burnt lime contain the same amount of lime as 100 lb. of carbonate of lime (ground or pulverised limestone), 100 lb. of old air-slaked lime, or 74 lb. of water-slaked lime. One hundred tons of burnt lime have the equivalent value of $178\frac{1}{2}$ tons of pulverised limestone or carbonate of lime.

The pulverised limestone is much more agreeable to handle than burnt lime, even when the latter is air-slaked; but in considering cost it has to be remembered that in value 1 ton of burnt lime is equal to approximately $1\frac{3}{4}$ tons of ground limestone, and will slake to that amount.

The Railway Department, at the request of the Bureau of Sugar Experiment Stations, now carries lime at $\frac{1}{2}$ d. per ton per mile when the distance exceeds 25 miles.

Lime should be spread broadcast with shovels, selecting the early morning for the purpose, when there is little or no wind, and it should be immediately ploughed under. This ploughing should be shallow, as the lime will naturally work through the soil. It is sometimes preferred to harrow the lime in, reserving the ploughing till a few weeks later.

Machines are made to distribute lime, and an implement of this nature can be very well used with pulverised limestone and slaked lime.

Necessity of Restoring Humus to Soils.

One of the best methods in preparing land for cane crops is the growth of a green manure crop and its subsequent ploughing under. This

is not only a form of rotation, which in itself is highly beneficial, but it is a means of restoring humus to our old cane lands, and is a prime essential in the making of a fertile soil. Humus benefits the soil physically—

1. By augmenting its water-holding capacity.
2. By increasing its warmth.
3. By bettering its texture and being a controlling factor in the determination of fine earth.

The defence of this continent and the maintenance of White Australia are involved in the preservation and advancement of the sugar industry.

Humus in the soil is lowered by—

1. The continued growth of crops.
2. Bare fallowing.
3. The continued use of artificial fertilisers.

The best possible crops to grow for green manuring purposes are the legumes, such as cowpea, Mauritius bean, velvet and soya beans, lupins, vetches, &c., and it is strongly recommended that an excellent method for restoring fertility to the soil is the growth of a leguminous crop of some kind for the purpose of ploughing under.

Generally speaking, it takes from six to eight weeks for the crop to rot down. When this has taken place, if the time is convenient, the ground can be got ready for the succeeding cane crop.

Drainage.

If the ground is inclined to become water-logged, or if subject to heavy tropical rains, it would be wise to drain the area to be put under cane. Tile draining is the best form to adopt; but this is usually costly, and good results may frequently be obtained from surface drainage, such as laying the land in beds, with a water furrow between so many rows of cane. These can be led to drains along the headlands if the lay of the land is suitable.

Deep Ploughing and Subsoiling.

The tractor for ploughing purposes is now coming into extensive use, in North Queensland especially, and in many places good and inexpensive work is being done by its means. It is, however, of limited use on small areas, where horses are to be preferred. Nearly all the tractors in use pull from two to four discs and burn crude kerosene.

Land for canegrowing should be cross-ploughed deeply, not less than four times, and well worked up by harrowing, and, if necessary, rolling till it attains a fine state of tilth for planting. Every energy should be

bent towards securing the land in perfect heart, remembering that tilth should be secured prior to planting, not after it. With a good deep soil-bed in fine order the best results can be hoped for. In considering this phase of the question the matter of subsoiling naturally crops up.

The experience of the Mackay Sugar Experiment Station, and of many Queensland farmers who have tried it, is that subsoiling pays handsomely on alluvial soils. The method of subsoiling recommended is to open up a furrow with the swing plough to the depth of the soil usually ploughed, and then to use a subsoiler, which will loosen or stir the soil to the depth of another 6 inches below this, but which will not bring any of this lower soil to the top. At the Mackay Station the depth ploughed varies from 12 to 14 inches and the depth of the subsoil-stirring from 6 to 8 inches, thus forming a mass of fine, loose soil for the needs of the crop, while it is also a great help in the conservation of soil moisture. That the roots of the cane will take advantage of deep and subsoil cultivation is shown by the fact that roots have been found at 4 feet deep in loose soils.

Good cultivation, careful choice of plants, and proper fertilising are the factors of success in canegrowing.

Having got our soils in perfect tilth, as previously described, we must now turn our attention to the planting, upon which so much depends. The greatest supervision should now be exercised, so that only good, sound plants, free from disease, are selected. Even if it is necessary to pay a somewhat higher rate for good plants from outside, it is well worth while. Generally speaking, plant cane from 10 to 12 months old, or first ratoon of the same age, should be taken. If the time of planting corresponds to that of harvesting, it is a good plan to cut as many top plants as possible from the best of the cane going to the mill. These are undoubtedly superior to the parts of the cane situate lower in the stick, although butts make good plants. Top plants cannot always be procured, and it is then usual to cut up the whole stick for plants.

The best width of row has been found from numerous experiments in Louisiana, Hawaii, and Queensland to be 5 feet, though in the case of a straight-growing cane, such as D. 1135, this could be reduced to 4 feet 6 inches. The drilling is best accomplished by means of a double-mouldboard or drill plough. The plough should make a good wide drill about 9 to 10 inches deep in the loose soil. Where the cultivation has been deep and good, this will leave a few inches of soil for the plant to lie on. Some farmers believe in going very deep with the plough and cleaning everything out to the hard bottom, but our experience has been that better results are obtained where a certain amount of loose earth is left at the bottom of the furrow. Moreover, in a dry time, when planting by hand, there is usually a certain amount of moisture in this loose soil into which

the plants can be pushed down, and so give them a much better opportunity to strike more rapidly. Three-eye plants are almost universally favoured, but the distance at which the plants are to be spaced apart in the row varies greatly in the different districts. At Bundaberg the plants are often placed 12 to 18 inches apart, while on the Herbert River the planting is almost continuous. A good average distance for the spacing, and one we have found to give good results, is 6 to 9 inches. In North Queensland Badila can be planted 12 inches apart. The plants are usually put in about 9 inches deep when planting by hand and covered with from 2 to 4 inches of soil—2 inches when conditions are very moist and 4 inches when they are very dry. When planting by hand, the cane sets should be laid in the ground with the eyes at the sides if possible. The cane-planting machine, however, is now largely used, and, while spacing cannot be carried out so evenly by its means, it puts the plant well down into the moist soil. It is a great labour-saver, and many types of machine are now upon the market.

Queensland requires to increase its yield of cane and sugar per acre. Only the best treatment of the soil will do this.

As soon as the cane is up about 6 inches the subsequent shallow cultivation of the interspaces between the rows should take place; the drills may be cleaned and cultivated with what is known as the cane chipper or drill cleaner, or cultivating and weeding attachment. Failing one of these the drills must be chipped or weeded by hand with hoes.

Shallow cultivation of the interspaces after the crop is up not only destroys weeds but leaves a level mulch of soil on the surface, and so conserves the moisture. Every care should be taken not to cut the young roots of the cane which are commencing to form and reach out for plant foods and moisture. The cultivator should be run over the interspaces, if possible, every fortnight until the cane is high enough to lay by—i.e., if the cultivation between the cane pulls off green leaves it should be discontinued.

The method of cultivation of interspaces at the Sugar Experiment Stations is by using a Planet Junior cultivator fitted with broad sweeps or hoes. Good results have always followed this, and it is most necessary during dry periods.

While the use of a disc harrow may be permitted during the early stages of the crop, especially when some form of drill cleaner is pulled behind, its use should be prohibited directly it is found that the young cane roots (which subsequently begin to stretch out laterally) are being cut.

Application of Manures.

When the young plant cane is about 18 inches high the application of fertilisers should be made, if considered necessary, to the plant crop. From a long experience of Queensland cane lands, it can be definitely affirmed that the manurial elements needed in the growing of successful cane crops are nitrogen, potash, and phosphoric acid. These are usually supplied in the following fertilisers:—

Nitrogen in—

- Nitrate of soda contains about 15 per cent. nitrogen.
- Sulphate of ammonia contains about 20 per cent. nitrogen.
- Nitrate of lime contains about 12½ per cent. nitrogen.
- Nitrolim contains about 18 per cent. nitrogen.
- Dried blood contains about 11 per cent. nitrogen.
- Meatworks manure contains about 3 to 7 per cent. nitrogen.

Potash in—

- Sulphate of potash contains about 48 per cent. potash.
- Muriate of potash contains about 50 per cent. potash.

Phosphoric acid in—

- Superphosphate contains about 16 per cent. phosphoric acid.
- Rock phosphate contains about 18 per cent. phosphoric acid.
- Guano contains about 15 per cent. phosphoric acid.
- Thomas phosphate contains about 17 per cent. phosphoric acid.
- Meatworks manure contains about 17 per cent. phosphoric acid.
- Bonedust contains about 20 per cent. phosphoric acid.
- Basic superphosphate contains about 19 per cent. phosphoric acid.

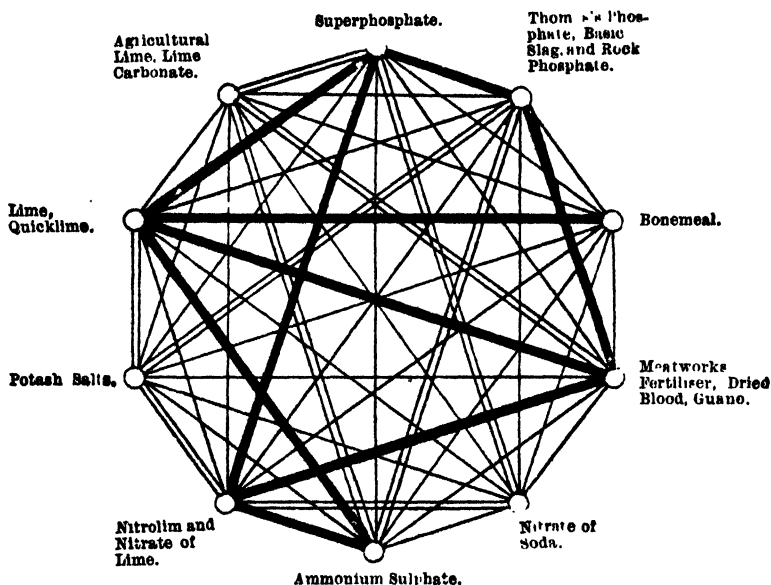
Thorough cultivation means increased production per acre.

Under the Fertilisers Act it is required that the dealer shall at the time of sale, or before delivery, give to the buyer an invoice certificate signed by the seller or his agent, stating the full name and place of business of the dealer; the name, trademark, brand, or sign used to mark packages containing such fertiliser and used to identify such fertiliser; the quantity or net weight of fertiliser comprised in the sale; the composition of the fertiliser, setting forth the proportion per centum in which such fertiliser contains the following ingredients:—Nitrogen, phosphoric acid, potash, and lime, and the forms in which they respectively occur; and, in the case of bonedust, basic slag, agricultural lime, &c., the percentage of coarse and fine material.

Furthermore, every dealer who sells fertiliser, which term includes offering or exposing for sale and having in possession for sale, shall

securely affix to each package a printed label, clearly and truly certifying:—The number of net pounds of fertiliser in the package; the figure, trademark, or sign under which the fertiliser is sold; the chemical composition of the fertiliser, in the same manner as stated on invoice certificate; and the state of fineness for certain fertilisers.

In mixing fertilisers care must be taken not to bring ingredients together which would lead to decomposition or loss of some part of the manure. Thus, should lime be mixed with sulphate of ammonia, a loss of nitrogen would take place. A simple guide for the mixing of manures is given in the accompanying diagram:—



All fertilisers joined by a *single line* can be safely mixed together and kept for any length of time. Fertilisers joined by a *heavy black line* should never be mixed together; those connected by a *double line* should only be mixed immediately or a short time before application.

Canegrowers can send samples of their soils to the Department of Agriculture for free analyses, and letters of advice as to the application of fertilisers by the Director of Experiment Stations will be sent out with the results.

The following is a typical mixture for sugar-cane, which could be varied according to requirements:—

250 lb. sulphate of ammonia per acre.

100 lb. sulphate or muriate of potash per acre.

250 lb. meatworks manure per acre.

Experiments in the field with fertilisers is a practice that can be highly recommended.

In applying nitrogen, if nitrate of soda is used, it should be remembered that it is easily leached from the soil; hence it should not be

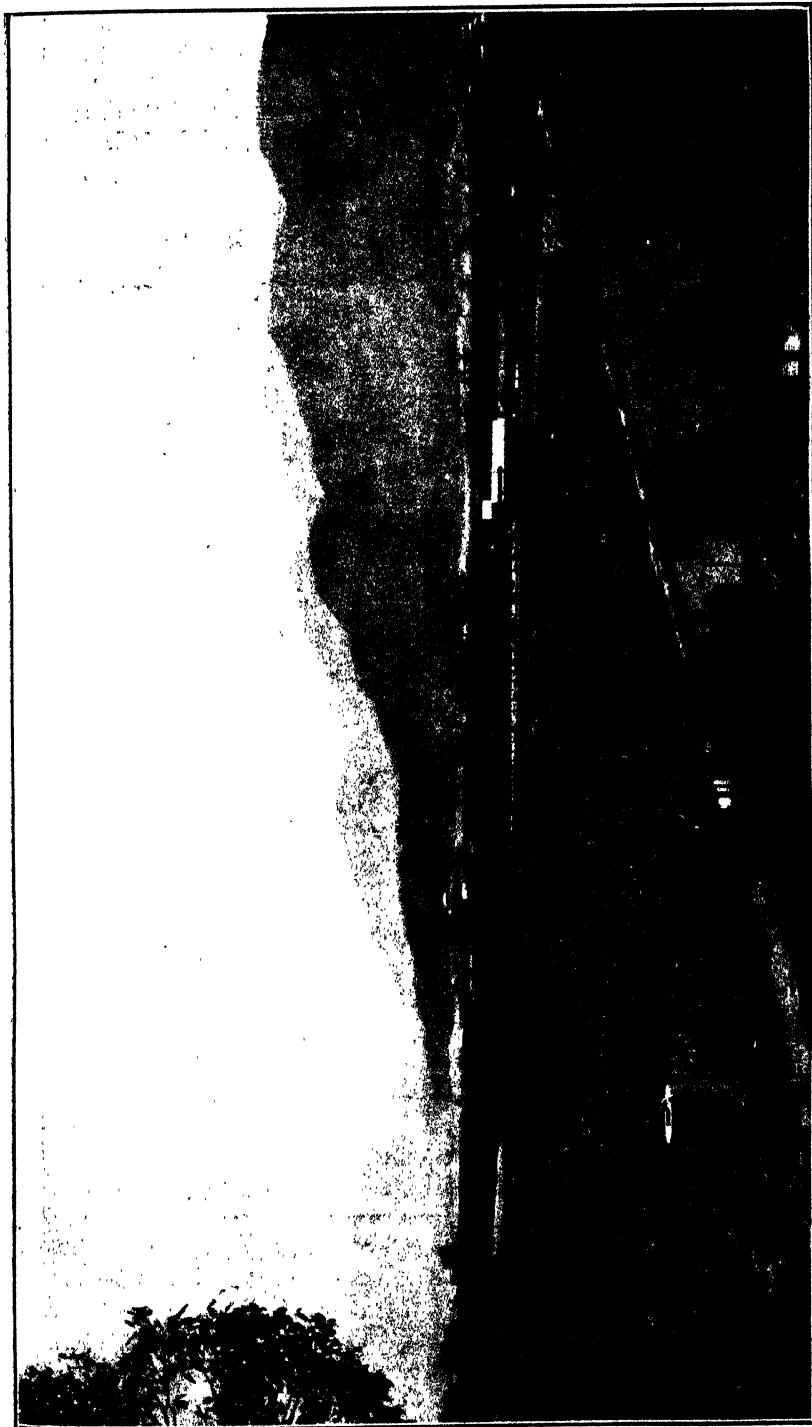


PLATE 5.

From Bombardier Farm.)

CANE FIELDS AT THE FOOT OF BARTLE FRERE, THE DOMINATING MOUNTAIN MASS OF THE COASTAL RANGE, BABINDA, NORTH QUEENSLAND.

applied during a heavy wet season. It is a great plant stimulant, and has frequently been found to add such strength and vigour to cane plants that it strongly aids in obtaining other mineral food, such as potash and phosphoric acid, from the natural reserves in the soil. Nitrate of soda will often show its effects in a week or two, producing a rich, dark-green colour in the foliage, and cause a marked improvement in the growth of the cane.

Nitrogen, in the form of sulphate of ammonia, is not so quick in action as in nitrate of soda, while nitrogen in dried blood, bonedust, and meatworks manure is still slower in action, requiring chemical changes to convert it into nitrate so as to become available to the plant. Meatworks manure in the wetter cane areas of North Queensland is preferable to superphosphate as being less soluble.

It is not recommended that mixed fertilisers should be placed in the drill with the cane plants. As soon as the cane is about 18 inches high drills 4 to 5 inches deep should be drawn about 10 inches from the young cane on each side of the row, and the fertiliser is put into these drills and then covered, or a manure distributor can be used. Both sides of the row, however, should be treated. If nitrogenous fertilisers alone, such as nitrate of soda and sulphate of ammonia, are being used, they can be applied on the surface of the soil near the cane. Organic forms of nitrogen, such as meatworks and blood manures, requiring the action of soil organisms to render them available, should be placed in drills as above and covered.

For ratoons the manures can be applied while working the interspaces. They may be dropped in the furrow ploughed away from the cane and then covered.

On given soils, particularly on some of the red volcanic type, better results from the use of organic fertilisers, such as bonemeal, blood manure, meatworks manure, &c., have been realised. Megasse ash, molasses ash, farmyard manure, and filter press cake should all be availed of when they can be procured. The latter should be ploughed in some three or four months before the cane is planted, and the same may be said regarding the application of molasses when used as a manure.

Restore the plant foods to the soil.

Sugar-cane removes varying amounts of the vital elements from the soil. It is estimated, from analyses of the total cane plant (except roots) made in the Agricultural Laboratory, that the variety known as Clark's Seedling, sixteen months old, took from the soil 163 lb. of potash, 83 lb. of phosphoric acid, and 96 lb. of nitrogen, while the variety known as Badila, of the same age, took out of the land 139 lb. of potash, 44 lb. phosphoric acid, and 107 lb. of nitrogen per acre.

If the above instructions have been followed, the season favourable, and the land of fair average quality, a heavy crop of cane should result. This on old lands is usually easily harvested, as facilities in the way of tramlines are, as a rule, provided. The cost of cutting is governed by the Award of the Board of Trade. Farmers should be particular in having their cane cut to the ground level, or slightly below it, because if this is done the cane ratoons very much better. Unsightly stumps of cane sticking up above the soil for 3 or 4 inches or more should be strongly condemned.

When the cane is harvested it is necessary to turn to the ratooning of the cane—i.e., the second growth of a crop from the stools of the first or plant crop.

Ratooning.

As soon as the cane is cut the farmer must make up his mind as to what he is to do with the trash, or dead leaves and tops, from the preceding crop. The tops whilst green are to a large extent used for forage purposes, so that, as a rule, there are not many of these left. The trash is usually burned in Queensland, but, if possible, after the last ratoon crop has been taken off it should be ploughed in to provide humus for succeeding crops of cane.

Practise the best methods of ratooning. They will be found the most profitable.

Ratoons should be well cultivated, and the following method can be recommended:—Immediately the trash is burnt off open up the middles of the rows to a depth of at least 9 inches with the swing plough. Next plough away from the cane rows on to the middles so that all the ground between the rows has been moved. Then run the tine harrows over all to level off. On alluvial soils all the rows should be subsoiled to a further depth of 6 inches after the swing plough is used. Subsequent cultivation with the Planet Junior fitted with broad hoes can then be carried out in the same manner as recommended for the plant crop. The results obtained at the Mackay Sugar Experiment Station for this method were as under:—

| Crop. | Yield of Cane per acre where the ground between the rows was ploughed and subsoiled. | | | | | Yield of Cane per acre where the ground between the rows was only ploughed to eight inches. | | | | |
|------------------------|--|----|----|----|----|---|----|----|----|------|
| | English Tons. | | | | | English Tons. | | | | |
| First Ratoons | .. | .. | .. | .. | .. | 38.9 | .. | .. | .. | 27.0 |
| Second Ratoons | .. | .. | .. | .. | .. | 31.3 | .. | .. | .. | 19.2 |
| Third Ratoons | .. | .. | .. | .. | .. | 20.4 | .. | .. | .. | 9.91 |

These experiments were not fertilised.

By adding manures still larger results have been obtained. The usual methods practised by farmers, however, do not make use of the subsoiler. The following are favourite ways of ratooning:—

(a) Trash burnt and four furrows ploughed between cane rows. Land levelled down by use of tine harrows or cultivator.

(b) Trash burnt, procedure same as above, but only three furrows ploughed between rows.

(c) Trash burnt and ground cut up first with disc harrows cross-ways. Then use of plough between rows, followed by tine harrows crossways.

(d) Trash burnt, four furrows ploughed between rows, and skeleton plough used in furrows next to cane.

(e) Trash burnt and land treated with spring-tooth cultivator or a grubber instead of being ploughed.

(f) Trash left and rolled in each alternate interspace. Every other interspace well cultivated with the plough. In this way each row of cane has one side cultivated and one side uncultivated, but covered with trash.

(g) Trash left and cane allowed to volunteer without any cultivation at all. This method is sometimes advantageous in a droughty season, but is not to be recommended as a regular thing.

All these methods are in use, or some variation of them. In the writer's opinion the best cultivated ratoons (other things being equal) give the highest yields.

As a rule, considerably more benefit is got from the manuring of ratoons than from the manuring of plant cane, and this experience is common. This is strikingly shown in the following summary of experiments carried out at Mackay:—

| Plant Crop. | | | First Ratoon Crop. | | |
|--------------------|-------------|-------------|--------------------|-------------|-------------|
| Manures. | No Manures. | Difference. | Manures. | No Manures. | Difference. |
| 50.7 | 47.4 | 3.3 | 42.4 | 31.7 | 10.7 |
| Second Ratoon Crop | | | Third Ratoon Crop. | | |
| Manures. | No Manures. | Difference. | Manures. | No Manures. | Difference. |
| 38.8 | 24.1 | 14.7 | 35.9 | 19.8 | 16.1 |

The above are in terms of tons of cane per acre.

Irrigation.

The climatic variations in Queensland from year to year are often so great that canegrowing is only certain in those districts possessing a

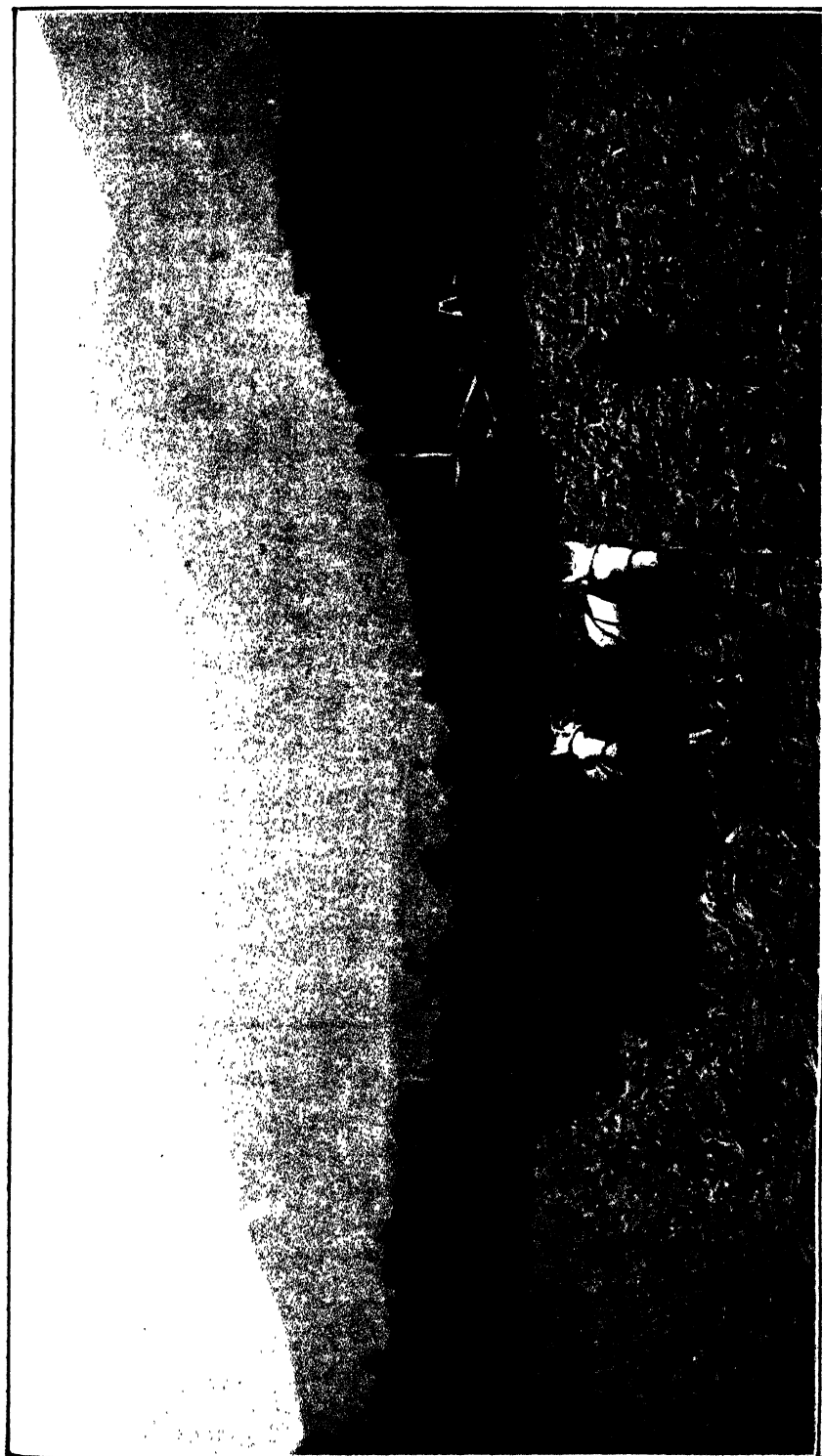


PLATE 6.—FROM FIELD TO MILL—READY FOR THE ROAD, BABINDA, NORTH QUEENSLAND.

high average rainfall. Districts with an average rainfall of 50 inches and under suffer exceedingly during dry spells, and irrigation would prove highly payable in such localities.

At the present time the only canegrowing district that uses irrigation water to any extent is the Lower Burdekin, situated some 40 to 50 miles south of Townsville. On the north side of the Burdekin River irrigation has been practised for a number of years, the plants used being the property of the farmers. Water is found at shallow depths, and is easily obtainable by sinking spearheads. On the south side of the river the Government have installed a complete system, available to growers of cane. Wells have been sunk and the pumps are electrically driven from a central power-house.

The cost of applying irrigation water on the Lower Burdekin is comparatively high, even though the most economical method is used, but the results usually pay extremely well.

Efficiency in Sugar Growing.

Efficiency in the production of cane depends upon a number of factors, the principal of which could be summarised as follows:—

1. Each cane farmer should make a study of his soil, from both a physical and chemical standpoint. The analyses of cane soils are carried out free of charge by the Bureau of Sugar Experiment Stations, and a great deal of useful information can be learned in this way.

2. The equipment of a cane farm should be the best possible, and every attention should be given to the care of implements, preservation of harness, and the health and feeding of farm animals. Ploughs and other implements should not be left out in the weather, but be carefully greased and put under shelter as soon as finished with. The best and latest type of implements should, if possible, be procured, so that work may be done economically as well as efficiently.

Make it your aim to be an efficient cane farmer and so make money.

3. Labour of the best type should be selected, and the farmer should aim at making his permanent hands comfortable, at the same time giving them to understand that he expects a fair day's work for a fair day's pay.

4. Proper methods of keeping accounts should be adopted on the farm, so that the canegrower knows what he is about and what each operation is costing him. Nowadays a farmer has to be a sound business man to be efficient, as there are so many different phases requiring attention. He must be familiar with profit and loss, otherwise he will work in the dark.

5. Varieties of cane should be selected which are likely to give the highest results from a commercial cane-sugar point of view and yield of cane per acre.

6. In preparing for a plant crop, the soil should be thoroughly stirred by at least four ploughings, the depth of each being regulated by the depth of soil. In alluvial soils, such as river banks, subsoiling frequently gives excellent results in the shape of enhanced crops. Care should be taken that the soil presents a fine state of tilth just prior to planting.

7. The planting of cane should be very carefully supervised, and only good, sound plants free from disease should be used.

8. Fertilisers should be judiciously chosen, and care should be exercised in purchasing, so that the best and most concentrated fertilisers are procured. The farmer should see that he obtains the manure he orders, and should not buy more manure than he intends using. Bags of fertiliser should be prevented from getting wet. Advice as to fertilisers can always be obtained from the Bureau of Sugar Experiment Stations. Rotation should be practised, and green manure crops, such as Mauritius bean and cowpea, made use of for maintaining the nitrogen and humus contents in the soil.

9. It may be necessary on some soils to apply lime for the purpose of sweetening soils, rendering stiff soils more friable, and correcting mineral acidity.

10. The weeding should be carefully and efficiently done, and head-lands should be kept clean so as to prevent rats and other pests that injure cane. The canefields themselves also should be kept as clean as possible, so that the plant foods in the soil go towards feeding the cane and not towards feeding weeds.

11. Farmers should endeavour to grow their own forage for stock purposes.

12. Vegetable and fruit growing on a small scale is useful for the dietary of the farmer and his employees, while one or two cows will also prove valuable in providing fresh milk and butter.

13. Every farmer should have a small area for experimental purposes, both for the growing of varieties and the testing out of fertilisers.

It may be objected that to carry out all the above will put too heavy a load on the small farmer, but these ideals could be kept in view and gradually put into practice. Many farmers, of course, have adopted most of these objectives towards efficiency and are successful accordingly.

What should be aimed at is the securing of higher tonnages from smaller areas of land. It is only by adopting the very best methods that this can be done and the overhead charges be reduced per ton of cane.

Weather.

Hot, humid conditions are the best for the sugar-cane plant, and, fortunately, these generally obtain during the period of the maximum growth of the crop in Queensland. The wet season is usually synonymous with the three hot summer months of January, February, and March.

Although the weather is hot and humid during this period, the higher temperatures experienced in the dryer belts of Australia are not common. A temperature of 100 degrees is rarely recorded. It is unusual for the thermometer to show much above 90 degrees, even in the middle of summer. Indeed, during times of heavy rain, the weather becomes comparatively cool, but as soon as the sun reappears the atmosphere becomes steamy and the growth of the cane is vigorously promoted.

On the coast of Queensland, where sugar is grown, the greatest rainfalls occur where the mountain ranges come close into the coast. Where they are considerably distant, as at Bundaberg and Ayr, the lowest precipitations take place. Consequently the greatest amount of rain falls at Babinda and Innisfail, where the lofty ranges of Bartle Frere and Bellenden-Ker are not far from the seaboard.

Rainfall.

The following table shows the average annual rainfall in each of the sugar districts:—

| District. | Average Annual Rainfall in Inches and Hundredths. | Districts. | Average Annual Rainfall in Inches and Hundredths. |
|-------------------|---|---------------------|---|
| Mossman | 82.91 | Proserpine | 76.96 |
| Cairns | 90.49 | Mackay | 68.52 |
| Mulgrave | 81.91 | Bundaberg | 44.40 |
| Babinda | 165.00 | Gin Gin | 37.71 |
| Innisfail | 149.20 | Childers | 42.07 |
| Ingham | 80.53 | Maryborough | 46.14 |
| Halifax | 89.17 | Pialba | 38.04 |
| Ayr | 44.48 | Nambour | 60.93 |
| Bowen | 40.60 | Beenleigh | 48.87 |

Exceptionally heavy rains occur occasionally, causing severe floods over the cane in low-lying areas. If the water subsides within two or three days little damage may be done, but should rain continue and the cane remain under water for a week or more, the crop is often lost.

Humidity.

The mean relative humidity or percentage of moisture in the air is a most important factor in the growth of cane. This is determined from the readings of the thermometers known as the "dry" and "wet" bulb.

The dry bulb shows the external shade temperature of the air, while the wet bulb shows the external shade temperature of evaporation, and

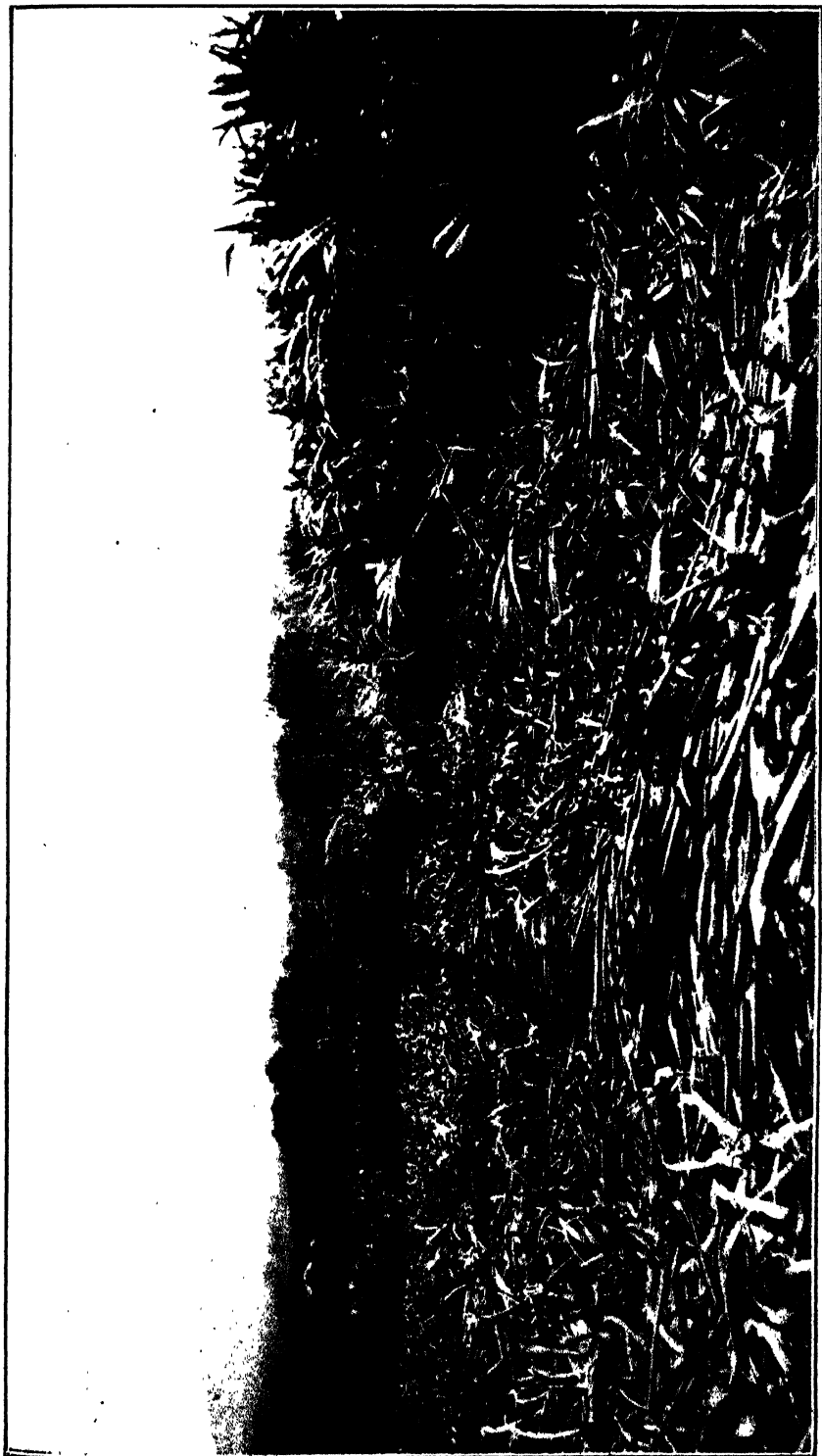


PLATE 7.—CUTTERS AT WORK IN A TYPICAL CANEFIELD, BABINDA, NORTH QUEENSLAND.

is kept covered by wet muslin attached to a reservoir of water by strands of cotton which keep the muslin supplied by capillary attraction. When the wet bulb under these conditions reads over 80 degrees the weather is exceedingly oppressive, and should it go up to 88 degrees it is regarded as highly prejudicial to human life. The table hereunder gives the percentage of relative humidity in the principal coastal towns in the sugar districts at 9 a.m.:—

| Place. | | | | | | | | | Percentage of Humidity. |
|-----------|----|----|----|----|----|----|----|----|-------------------------|
| Bundaberg | .. | .. | .. | .. | .. | .. | .. | .. | 69.0 |
| Mackay | .. | .. | .. | .. | .. | .. | .. | .. | 75.0 |
| Ayr | .. | .. | .. | .. | .. | .. | .. | .. | 68.0 |
| Innisfail | .. | .. | .. | .. | .. | .. | .. | .. | 80.0 |
| Cairns | .. | .. | .. | .. | .. | .. | .. | .. | 70.2 |

Frosts.

These principally do damage to sugar-cane in those districts from Mackay southward. More or less severe frosts occur every few years in the Bundaberg, Gin Gin, Maryborough, Mount Bauple, and Nambour districts, while parts of the Mackay district are occasionally affected. When cane is badly damaged by frost, the whole of the leaves become dry and yellow, and fermentation sets in down the stick, killing off the eyes. Unless such cane is quickly harvested and sent to a mill, deterioration sets in rapidly, the commercial cane sugar is greatly reduced, and it soon becomes unfit for manufacture. If possible, therefore, when cane becomes frosted, immediate arrangements should be made for its crushing.

Droughts.

These rarely occur in the Northern sugar districts, and then only in a modified form. In some of the Southern sugar districts they take place periodically, and the only cure is an irrigation system.

Pests and Diseases.

The sugar-cane plant is subject to many pests and diseases. The Government, by its Agricultural Department and Sugar Bureau, maintain a staff of entomologists and pathologists to assist farmers in the control of insect pests and cane diseases. Numerous bulletins are issued for the guidance of farmers, and officers make visits to farms and give advice on the spot. Full information and help can always be obtained by communicating with the Director of Sugar Experiment Stations, care of the Department of Agriculture and Stock, Brisbane.

The most serious insect pest is the white grub. "The grub" is the popular name given to the larvæ of certain cane beetles which feed on the roots of sugar-cane. Another severe pest in North Queensland is the weevil borer, which attacks the cane by boring into it.

Other insects, such as moth borers, caterpillars, wireworms, and white ants, cause loss to canegrowers.

The major diseases attacking cane in Queensland are:—Fiji, Gumming, Mosaic, Leaf Scald, Leaf Stripe, Red Rot. Bulletins dealing with the control of these diseases may be obtained from the Bureau of Sugar Experiment Stations.

Do not neglect pests and diseases. Get advice at once.

Economics.

The price of sugar fluctuates from year to year, this being largely caused by seasonal variations. Under favourable climatic conditions over-production takes place, and this entails export of sugar abroad. The Australian price, which is at the present time £26 per ton, has to be pooled with the price that can be obtained for the product overseas. The amount received, therefore, varies in the proportion of exported sugar to that used for home consumption. The Queensland Government established a Sugar Board which deals with this aspect of the question and makes arrangements for the refining of the raw sugar. Arrangements have also to be made with the Commonwealth Bank respecting the financing of the exportable sugar. There is at the present time an embargo existing which prevents the importation of cheaply grown sugar from abroad, such sugar being produced by coloured labour. The price of sugar for the past three years has been as follows:—

| | | | | | | | £ | s. | d. |
|------|----|----|----|----|----|----|----|----|----|
| 1925 | .. | .. | .. | .. | .. | .. | 19 | 10 | 7 |
| 1926 | .. | .. | .. | .. | .. | .. | 24 | 10 | 10 |
| 1927 | .. | .. | .. | .. | .. | .. | 22 | 0 | 4 |

The exportable sugar for these years was:—

| | | | | | | | Tons. |
|------|----|----|----|----|----|----|---------|
| 1925 | .. | .. | .. | .. | .. | .. | 211,000 |
| 1926 | .. | .. | .. | .. | .. | .. | 74,777 |
| 1927 | .. | .. | .. | .. | .. | .. | 152,384 |

On the price of sugar depends the price paid to the farmers for cane. This is regulated by another Board created by the Queensland Government, called the Central Sugar Cane Prices Board.

The value of sugar produced in Queensland in 1927 was over £11,000,000.

A Local Cane Prices Board is constituted under the Regulation of Sugar Cane Prices Acts for nearly every mill in the State, on which boards the canegrowers have equal representation with the millowners. These boards have independent chairmen. The boards meet annually to fix the price of cane and the conditions governing the delivery of same. An Award is made; but should either side consider it unfair or unjust an appeal lies to the Central Board.

The Cane Prices Boards watch the farmers' interests.

Prices are fixed in accordance with the analyses of the cane at most of the mills—that is, the growers are paid on what is known as the commercial cane sugar in the cane. The Central Board also restricts the growing of disapproved varieties of cane—i.e., those with low sugar content or which for other reasons are not considered suitable. Cane testers are employed at the mills to safeguard farmers' interests. Their duties include the supervision of the weighing, sampling, and the analyses of the cane. This ensures the canegrowers getting a fair deal. The average price paid for cane in 1914 was only £1 3s. per ton. During the last two years the average price has been about £2 1s. 3d. per ton. It can safely be said that the operation of the Cane Prices Act has put over one and a-half million sterling into the pockets of the Queensland canegrowers than would otherwise have been the case.

The following is a specimen of a Cane Prices Board Award:—

| Percentage of Commercial Cane Sugar. | | | | | | | When 94 N.T. sugar is £21 1s. per ton. | Increase or Decrease per £1 above or below £21 1s. 0d. |
|--------------------------------------|----|----|----|----|----|----|--|--|
| 7 | .. | .. | .. | .. | .. | .. | £ s. d. 0 12 5 | s. d. 0 7 |
| 8 | .. | .. | .. | .. | .. | .. | 0 16 2 | 0 9 |
| 9 | .. | .. | .. | .. | .. | .. | 0 19 11 | 0 11 |
| 10 | .. | .. | .. | .. | .. | .. | 1 3 8 | 1 1 |
| 11 | .. | .. | .. | .. | .. | .. | 1 7 5 | 1 4 |
| 12 | .. | .. | .. | .. | .. | .. | 1 11 2 | 1 6 |
| 13 | .. | .. | .. | .. | .. | .. | 1 14 11 | 1 8 |
| 14 | .. | .. | .. | .. | .. | .. | 1 18 8 | 1 10 |
| 15 | .. | .. | .. | .. | .. | .. | 2 2 5 | 2 0 |
| 16 | .. | .. | .. | .. | .. | .. | 2 6 2 | 2 2 |
| 17 | .. | .. | .. | .. | .. | .. | 2 9 11 | 2 5 |
| 18 | .. | .. | .. | .. | .. | .. | 2 13 8 | 2 7 |

Deductions are made for burnt cane, diseased cane, bad topping, trashy or dirty cane.

Labour.

The wages paid to field labourers and canecutters are governed by Awards of the Board of Trade, and these are altered from time to time. The Award now existing is as follows:—

WAGES.

The rate of wages to be paid to employees shall not be less than the following:—

| | No. 1 District. | No. 2 District. | No. 3 District. |
|--|-----------------------------------|-----------------------------------|----------------------------------|
| | Per Hour. | Per Hour. | Per Hour. |
| | <i>s. d.</i> | <i>s. d.</i> | <i>s. d.</i> |
| (1) Field workers, over 18 years of age .. | 2 4 ⁹ / ₁₁ | 2 3 ² / ₁₁ | 2 2 ¹ / ₁₁ |
| (2) Youths from 14 to 16 years of age .. | 1 3 ³ / ₁₁ | 1 1 ¹⁰ / ₁₁ | 1 0 ⁹ / ₁₁ |
| Youths from 16 to 18 years of age .. | 1 6 ³ / ₁₁ | 1 5 ² / ₁₁ | 1 3 ³ / ₁₁ |
| Cane cutters (day labour) | 2 10 ⁹ / ₁₁ | 2 8 ⁷ / ₁₁ | 2 7 ³ / ₁₁ |
| | Per Week. | Per Week. | Per Week. |
| | <i>£ s. d.</i> | <i>£ s. d.</i> | <i>£ s. d.</i> |
| Field workers (over 18 years of age) engaged by the week | 4 16 0 | 4 10 0 | 4 6 0 |

CANECUTTING—WAGES AND CONDITIONS.

(1) Notwithstanding the rate hereinbefore provided for canecutters' day labour, an employee may contract with his employer to cut cane at piecework rates.

No canecutter shall be employed other than by day labour or at piecework rates.

(2) The minimum rates which shall be paid by the employer for cutting cane for harvesting at piecework rates shall be according to the following scale:—

| | No. 1 District. | No. 2 District. | No. 3 District. |
|------------------------------------|-----------------|-----------------|-----------------|
| | <i>s. d.</i> | <i>s. d.</i> | <i>s. d.</i> |
| 15 tons to the acre and over | 8 0 | 7 9 | 7 6 |
| 14 to 15 tons to the acre | 8 3 | 8 6 | 7 9 |
| 13 to 14 tons to the acre | 8 6 | 8 3 | 8 0 |
| 12 to 13 tons to the acre | 9 0 | 8 9 | 8 6 |
| 11 to 12 tons to the acre | 9 6 | 9 3 | 9 0 |
| 10 to 11 tons to the acre | 9 9 | 9 6 | 9 3 |
| 9 to 10 tons to the acre | 10 8 | 10 5 | 10 2 |
| 8 to 9 tons to the acre | 11 2 | 10 11 | 10 8 |
| 7 to 8 tons to the acre | 11 8 | 11 5 | 11 2 |
| 6 to 7 tons to the acre | 13 2 | 12 11 | 12 8 |
| 5 to 6 tons to the acre | 16 2 | 15 11 | 15 8 |

The rates for canecutting in the Proserpine district shall be 1½d. per ton more than those in the No. 2 district.

A Form of Agreement for cutting is provided in the Award, and can generally be bought at printers' and stationers' shops in canegrowing districts.

No agricultural industry in Australia employs so much manual labour or distributes so much capital.

Cost of Production of Cane.

This naturally varies in different localities and under seasonal variations. The cost in one district is often totally different to the cost in another. The more cane produced per acre the lower, as a rule, is the cost of production of a ton of cane. There are so many factors entering into the cost of production that it is not possible at present to give definite figures.



PLATE 8.—HAULING CANE TO THE MILL.

Government Assistance.

The Bureau of Sugar Experiment Stations, a sub-branch of the Department of Agriculture, was established by the Queensland Government in 1900.

This institution has at present three Sugar Experiment Stations—one at Mackay, one at Bundaberg, and a third on the Johnstone River near Innisfail. Laboratories are established at which soil investigations are undertaken, and analyses of fertilisers, limestones, waters, sugar-canes, and sugar-mill products are carried out for growers and millers.

The introduction of new varieties of cane from other countries and the raising of a large number of seedling canes is a part of the work of the Bureau. The testing of these upon commercial lines in laboratory and field entails much investigation. In addition to this, experiments in cultivation, rotation, fertilising, and irrigation are carried out.

Entomological Stations are in existence at Bundaberg, Mackay, and Cairns. Pathological investigations into diseases of sugar-cane are carried out by a staff of trained men.

Queensland's sugar production in 1870 was 2,851 tons; and in 1927 was 485,745 tons.

Financial Aid.

The Government assist farmers through the Agricultural Bank. The maximum amount that may be advanced to any one individual cane farmer or on any separate proposition is £1,700. The money may be utilised for the payment of liabilities already existing, the effecting of improvements, purchase of stock and plant, and for other purposes in connection with the undertaking.

The rate of interest on loans, excluding those discharging liabilities, is at present 5 per cent. per annum. The rate of interest for advances involving the discharge of liabilities for purchase money or mortgages is 6 per cent.

The term of the loan is fixed when the advance is approved, up to a maximum of twenty-five years, which includes a period of five years during which interest only is payable.

General details as to the securities required and other conditions attaching to advances may be ascertained on reference to the pamphlet issued by the bank.

It may be pointed out that many of the growers obtain seasonal assistance on the security of crop liens, to which the bank usually raises no objection in cases where it is interested.

Many thousands of pounds have been granted to growers in the principal canegrowing districts of Queensland. A large proportion of such advances was made for the purpose of releasing existing liabilities on the holdings.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

RURAL ROUTES IN QUEENSLAND.

THE WORK OF THE MAIN ROADS COMMISSION.

The Seventh Annual Report of the Main Roads Commission, from which the subjoined notes have been taken, commends itself strongly to all concerned with rural progress in Queensland.

A web of well-constructed arterial highways is spreading gradually over the State. This is a result of the soundly organised work of the Commission in conjunction, when necessary, with Local Authorities. A survey of a year's achievements leaves the impression that the Commission is one of the most important factors in our country life.

Through the courtesy of the Commission we are enabled to reproduce some of the excellent plates included in its Report, and which illustrate the immense value of its community services.—Ed.

SUMMARY OF OPERATIONS.

IN the course of the year a length of 683 miles of main roads was gazetted, while the total of developmental roads was increased by 104 miles. This makes the total lengths as at 30th June, 1928—5,576 and 362 miles respectively.

Two hundred and twenty-eight miles of road were completed and 130 miles were partially completed during 1927-28 in the area of ninety-four Local Authorities. In addition 2,035 lineal feet of bridges and culverts over 3-feet span were completed and 3,327 lineal feet were partially built. This makes the total length of works completed (and the equivalent in partially constructed work) 890 miles of road and 13,200 lineal feet of bridges, representing an approximate average cost of £3,321 per mile, inclusive of bridges, a number of which have been of some magnitude, or £2,763 per mile, exclusive of bridges.

Maintenance works were carried out on over 5,030 miles of road in 113 Local Authority areas. These works included the reconstruction and maintenance of bridges, and complete patrolling and seasonal maintenance of roads constructed under the Main Roads Acts and Federal Aid Roads Agreement.

Compared with the year ending 30th June, 1927, the number of Local Authority areas in which permanent works and maintenance has been carried out has increased by 12 and 9 respectively.

It is interesting to compare road expenditure in this State with that of the United States, with its population of 115,000,000 and area of 3,027,000 square miles. The annual main road expenditure of the United States approximates 23s. 3d. per head or £44 per square mile. Queensland, with a population of 911,700, expended last financial year an amount of £678,399 on permanent works on main roads, equal to 15s. per head or £1 0s. 3d. per square mile. The total expenditure incurred by the Commission on permanent works and maintenance for the year amounts to 18s. 2d. per head or £1 4s. per square mile.

The average costs under the Federal Aid programme in the United States of America for the fiscal year 1928 are between £5,000 and £6,000 a mile, but in Queensland it is necessary to make our money go nearly twice as far.

The ratios of mileage completed during last year to population in Queensland amounted to 1 to 3,400, as compared with that of the United States of America in the year 1924, viz., 1 to 7,400. This comparison is not intended to show that road work is being carried out more cheaply than in the United States of America, but to show that we are endeavouring to serve our vast areas and sparse population in the way most needed.

The report of the British Ministry of Transport 1926-27 indicates main road allocations of £18,050,000. It is worthy of note that maintenance costs in Great Britain have increased from £273 per mile in 1921-22 to £356 per mile in 1925-26.

It is common to read of the advocacy of the construction of hundreds of miles of roads paralleling our western railways. A moment's thought will convince most

Proposed Banana Board.

Notice has been issued of the intention, in pursuance of the provisions of the Primary Producers' Organisation and Marketing Acts, to make an Order in Council constituting a Board to deal with all bananas produced or to be produced within any part of Queensland for three years from the date of such Order. The Board to deal with the commodity will consist of five elected representatives of growers and the Director of Marketing. One growers' representative shall be elected from each of the following districts:—

District No. 1.—That part of the State north of and including St. Lawrence.

District No. 2.—Areas served by railway stations on the North Coast Line and branches south of St. Lawrence to and including Theebine.

District No. 3.—Areas served by railway stations on the North Coast Line and branches south of Theebine to and including Monkland.

District No. 4.—Areas served by railway stations on the North Coast Line and branches south of Monkland to and including Nambour.

District No. 5.—Areas served by railway stations on the North Coast Line and branches, Main Line and branches, South Coast Line, and suburban lines south of Nambour to the New South Wales border, including the Bay Islands.

Persons eligible to vote on any referendum or election prior to the making of the Order shall be persons who at any time since the 1st January, 1928, have had growing for sale bananas in any part of the State of Queensland, and persons eligible to vote on any subsequent election or referendum shall be persons who, at any time during the preceding twelve months, harvested for sale bananas produced within any part of Queensland.

Upon the making of the proposed Order, the whole of the said commodity (bananas) shall be divested from the growers and become vested in and be the property of the Board as the owners thereof.

To ensure their names being on the roll of persons eligible to vote, persons who at any time since the 1st January, 1928, have had growing for sale bananas in any part of Queensland, are invited to send their names and addresses at once to the undersigned.

Nominations for the election of a growers' representative for each of the above districts will be received up to the 12th February, 1929. These must be signed by not less than ten banana-growers as above.

Full particulars of the proposed Order in Council may be obtained from the "Government Gazette" of the 5th January, 1929, or upon application to—

E. GRAHAM, Under Secretary.

Department of Agriculture and Stock,
Brisbane, 3rd January, 1929.

Marketing Wool to Assist Farmers

The Minister for Agriculture and Stock, in order to assist farmers who carry not exceeding 1,500 sheep upon their holdings, to obtain the best prices for their wool, is prepared to receive such wool on owners' account, classify it, and place it upon the market so that it will not be sold under the star-lot conditions as it has usually been sold.

A correct account of the wool will be kept and each farmer will receive the amount received for same, less the necessary charges, which will consist only of the following:—

1. A charge for classification of 10s. per bale.
2. All freight, handling, dumping, and rebaling.
3. Other out of pocket expenses.

No commission will be charged, and if required an advance of 60 per cent. will be made by the Department of Agriculture and Stock upon the estimated value of the wool as at the time of receipt of the wool in the Department's Store.

The wool will be sold at the first wool sales following a sufficient accumulation to enable a bulk sale to be made.

It must be understood that the limit of this arrangement is 1,500 sheep, and that the Department will not accept a clip from a greater number.

Farmers desiring to accept this arrangement should notify the Under Secretary, Department of Agriculture and Stock, of their intention before consigning their wool, advice of which, with all particulars of brands, weights, &c., should be given.

The weights as taken in the Departmental Store, and the classification before sale, to be accepted as being final.

RECOMMENDATIONS.

(a) The bales should be branded on the cap only, so that the same packs, if in good order, may be used again. This saves the price of a new pack to the farmer.

(b) The wool requires no other treatment on the farm other than the removal of dags before rolling the fleeces.

(c) Locks and belly wool should be kept in separate packages.

E. GRAHAM, Under Secretary,
Department of Agriculture and Stock.

people that the interest, redemption, and maintenance would be much greater than the possible return, and that road construction is much more urgently needed in other directions. This does not, of course, apply to the construction of bridges or flood crossings on the type of route mentioned, the want of which is often a serious drawback.

A bulletin setting forth the results of labours and investigation by the Commissioner's officers into the aspects of road building, trend of motor vehicle registration, census of traffic, road protection regulations, soil sampling and examination and its practical application to road building is in process of collation.

It may be asserted confidently that, with the technical staff available well seconded by an accounting and clerical staff which has given of its best, the maximum output of work consistent with economical design, construction, and maintenance has been achieved.

The Local Authorities have in most cases effectively supervised and aided construction under the direction of the Commissioner's engineers, who have maintained close touch with the Local Authorities and have made full use of the local knowledge so necessary for the practical solution of many phases of road building.



PLATE 9.—ISISFORD SHIRE.

Reinforced Concrete Bridge over the Barcoo River, near Isisford, on Isisford-Emmett Road, in course of construction.

Failures of work have been of a minor nature and have always been turned to profit by the avoidance of similar mistakes in future works.

The recording and investigation of any defects appearing is a most important matter if progress is to be maintained, for it would be idle to claim that all work executed under so great a scheme as the main roads one has reached the acme of perfection. In a few instances deliberate risk of surface failure has been taken on short sections with a view to ascertaining whether economy could be effected in paving thickness or by the use of local materials.

In the course of the Report the finished jobs and works in progress in different parts of the State, both in agricultural and pastoral districts, are interestingly reviewed, and a full list of them is included. The Report also contains much useful information as to specified requirements in respect to different classes of jobs undertaken by the Commission, as well as plans and plates showing the several methods of construction adopted.



PLATE 10.—PIONEER SHIRE.
A Bitumen-surfaced road through canefields, Mackay District.



PLATE 11.—PIONEER SHIRE.
Mount Ossa-Kungurri Road, which will serve recent settlement in sugar-growing country.

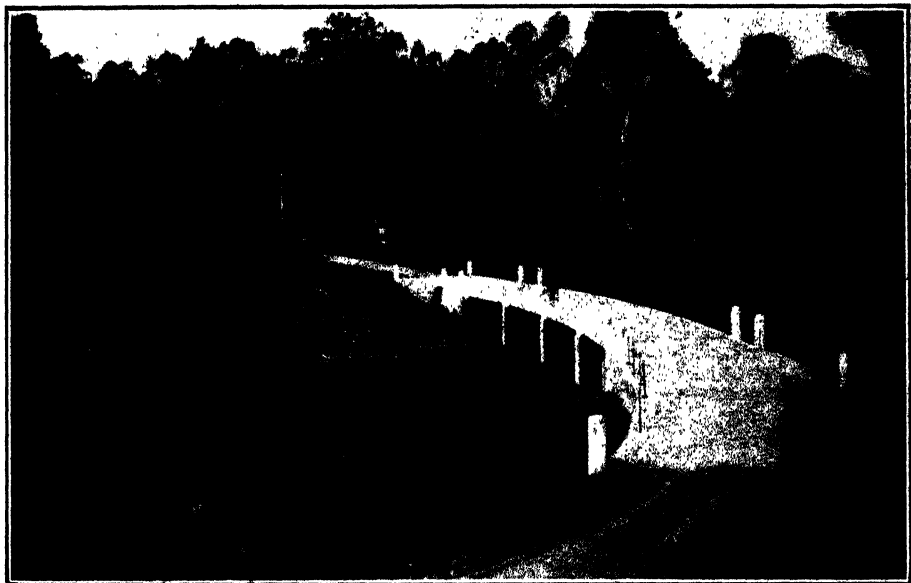


PLATE 12.—GAYNDAH SHIRE. GAYNDAH-GOOMERI ROAD.

Curved reinforced concrete low-level bridge over Barambah Creek, replacing an old crossing upon which traffic was regularly blocked for several months in the year.
Maximum flood-level, 90 feet above stream bed.



PLATE 13.—KOLAN SHIRE. GIN GIN-MIRIAM VALE ROAD.

Black Gully Bridge, typical of many similar structures erected in the course of the year.



PLATE 14.—KOLAN SHIRE.
Gin Gin-Miriam Vale Road, showing a gravelled section.



PLATE 15.—CLIFTON SHIRE. TOOWOOMBA-GOONDIWINDI ROAD.
Gravelled section in the wheat area.

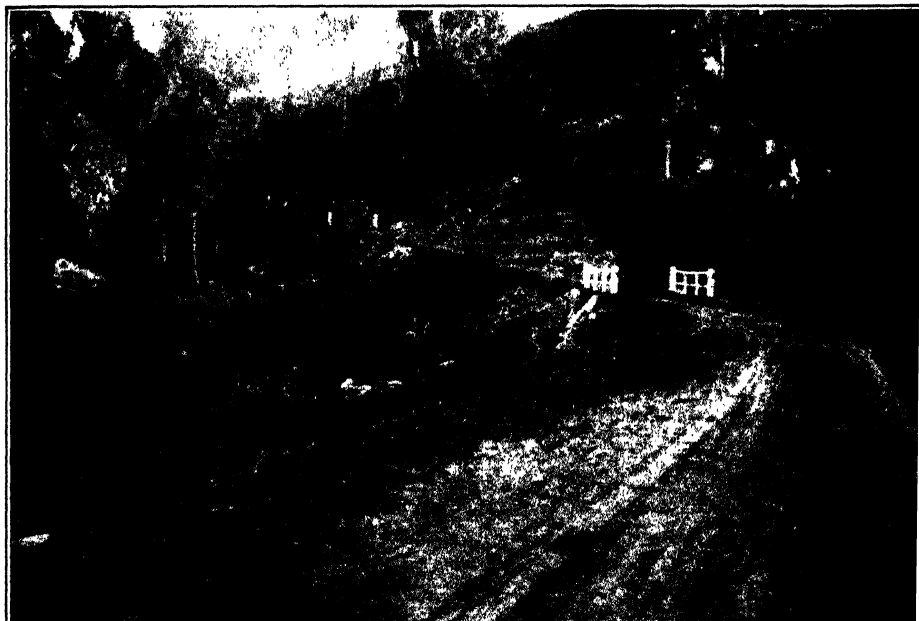


PLATE 16.—SHIRES OF TARAMPA AND CAMBOOYA.
Heifer Creek deviation, on the direct road between Clifton and Grantham.

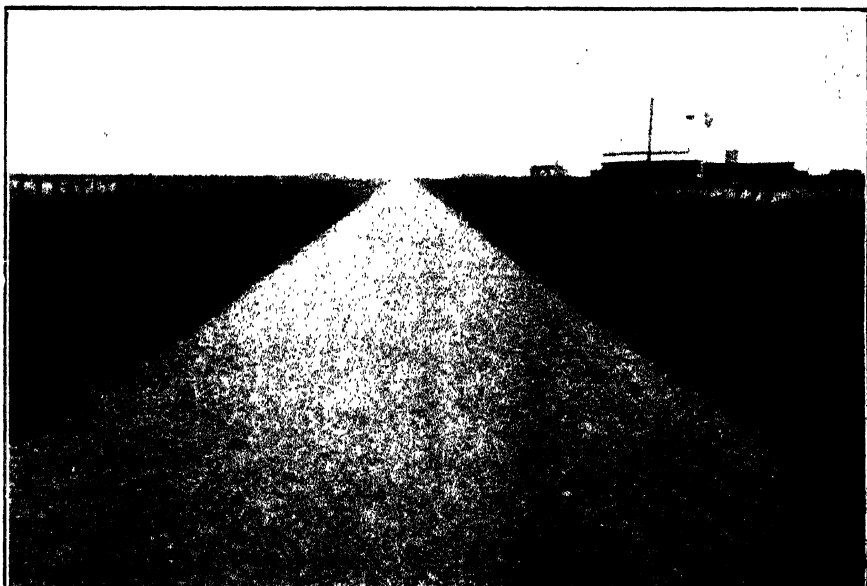


PLATE 17.—CAMBOOYA SHIRE. CAMBOOYA-GOONDIWINDI ROAD.
Heavy traffic—penetration bituminous macadam—section over black soil.



PLATE 18.—INGLEWOOD SHIRE.
Gravelled section, Inglewood-Texas Road.

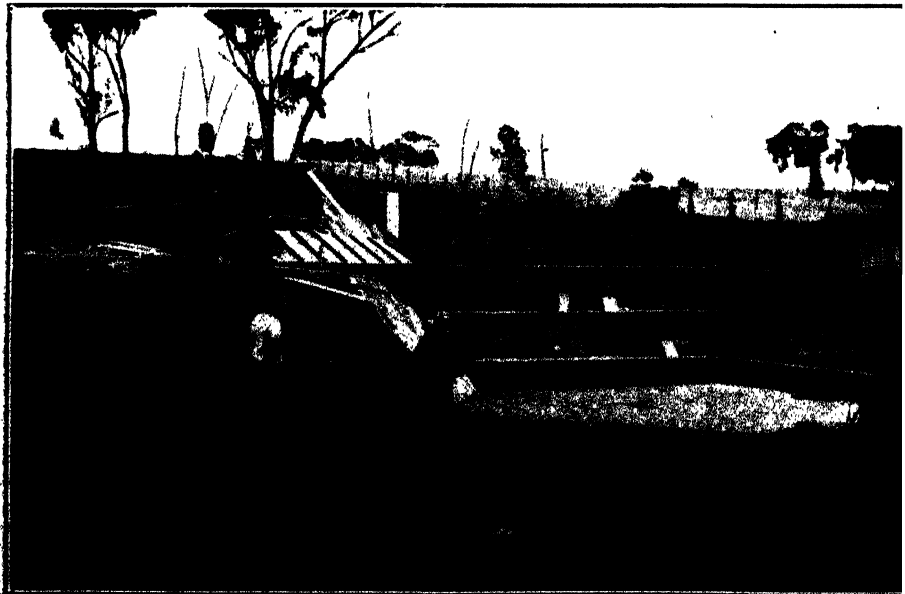


PLATE 19.—BUNGIL SHIRE. ROMA-NORTHERN ROAD.
Arresting creek erosion across road by V concrete drops.

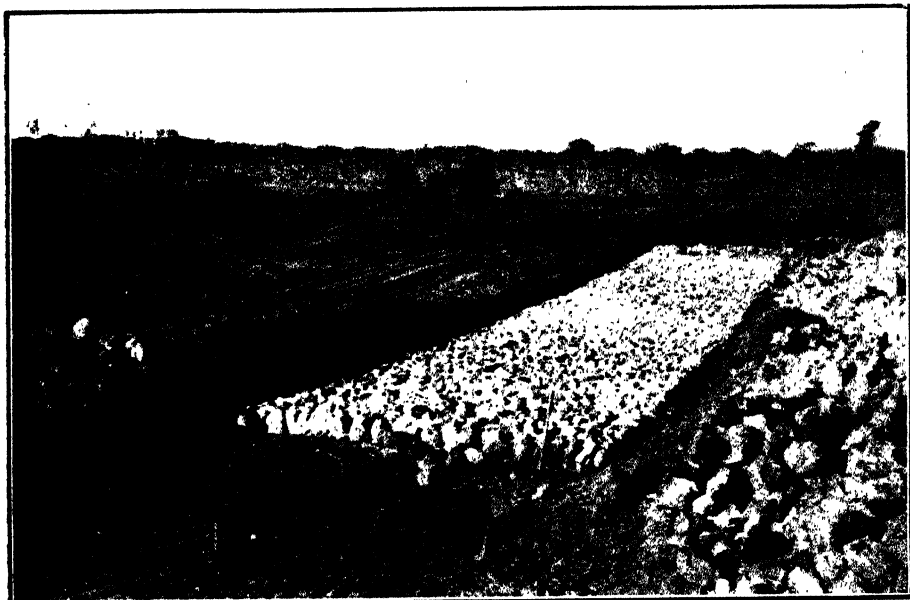


PLATE 20.—SHIRE OF BULLO. QUILPIE-EROMANGA ROAD.
Typical flood invert under construction.

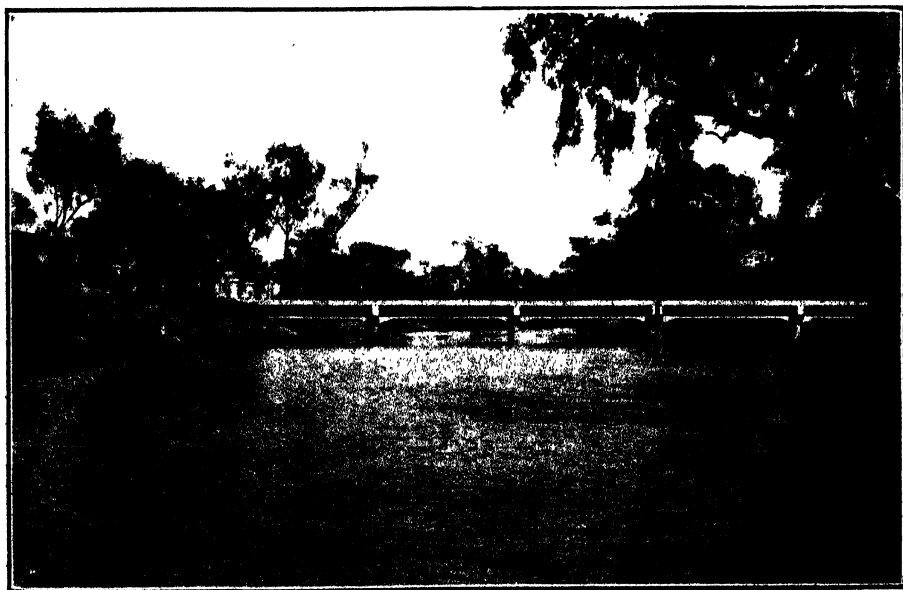


PLATE 21.—PAROO SHIRE.
Low-level reinforced concrete bridge over Paroo River at Eulo,
on Cunnamulla-Thargomindah Road.



PLATE 22.—BEAUDESERT SHIRE.

Brisbane-Mt. Lindsay Arterial Interstate Road, showing intermediate course of metal now being covered with penetration bituminous macadam.

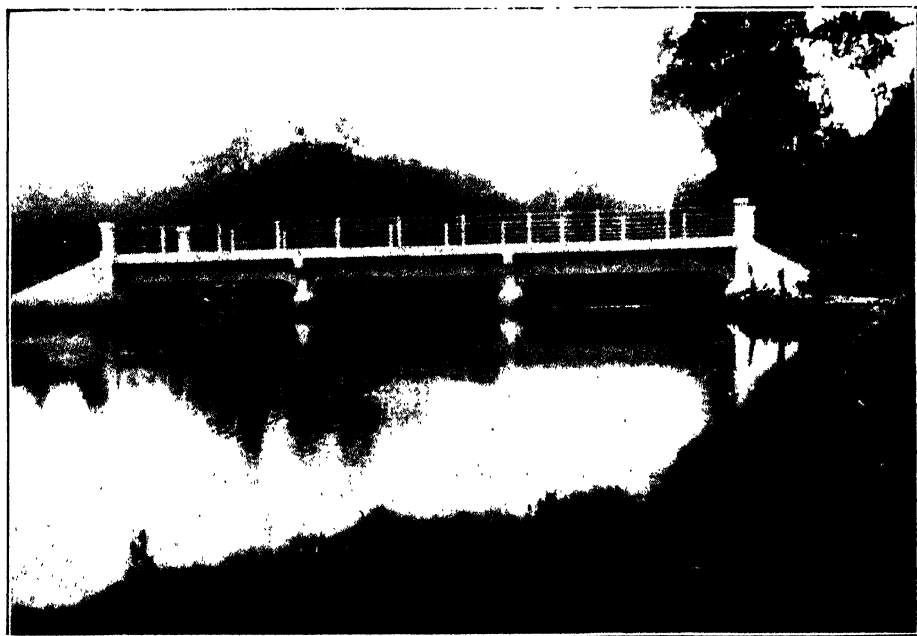


PLATE 23.—MAIN SOUTH COAST ROAD. COOMBABAH CREEK BRIDGE, SOUTHPORT DEVIATION.



PLATE 24.—MAIN SOUTH COAST ROAD, NEAR SOUTHPORT.
showing timber groynes and brush fences which have arrested wave action.



PLATE 25.—NERANG SHIRE. MUDGEERABA—SPRINGBROOK ROAD,
on which one-way traffic is regulated.



PLATE 26.—SHIRE OF NERANG. CURRUMBIN CREEK DEVIATION,
which eliminates several creek crossings and steep gradients.

QUEENSLAND RAIN-FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The tree which is the subject of this note and the accompanying illustrations is sometimes known as Yellow Tulip. This name originates from the remarkable resemblance of the bark to that of the Tulip or Tulipwood. The colour and markings of the bark are very similar in the two trees. In botanical terminology the Yellow Tulip is known as *Hemicyclia australasica*. The Tulip or Tulipwood is *Harpullia pendula*. The Yellow Tulip is a very common tree in many of the rain forests or "scrubs" from Port Macquarie, New South Wales (J. H. Maiden) to Cairns in North Queensland. It also occurs on Lord Howe Island. It appears to be most common in the scrubs of the drier areas or on fairly dry ridges. The trees attain a height of about 90 feet, and a stem diameter of about 2 feet, but the majority of the trees met with are much smaller. The freshly-cut wood is pale yellow in colour. It is very finely grained, fairly heavy, uniformly coloured, and not highly figured. Mr. E. H. Swain ("The Timbers and Forest Products of Queensland," p. 322) states that the wood could be used in place of English Boxwoods for rules, gauges, and small turnery. He quotes Mr. R. T. Baker to the effect that it would make good heads for golf clubs. The wood is not comparable with Tulip in colouring or ornamental effect. The Tulip, which is also a native rain-forest species, will be illustrated and remarked upon in a future issue.

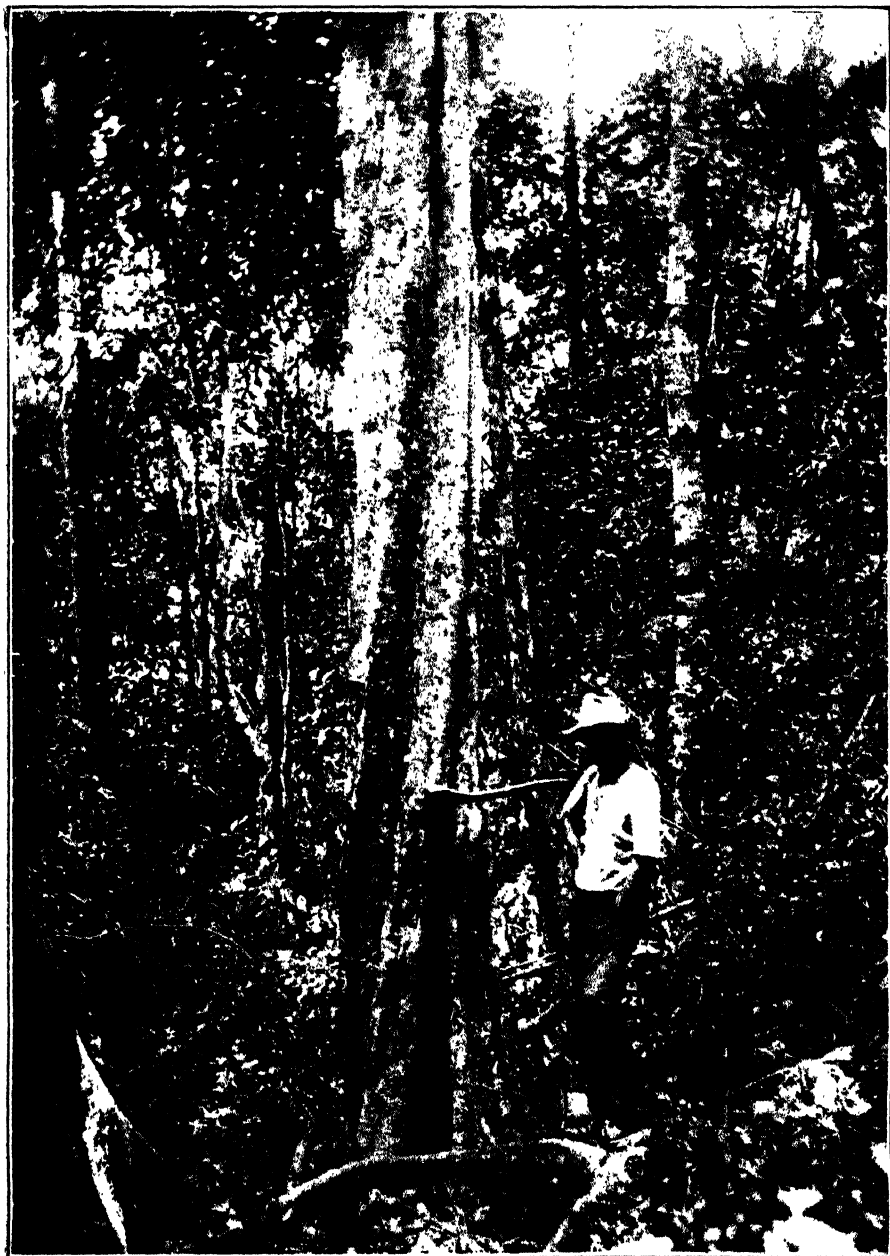


Photo.: W. D. Francis.]

PLATE 27.—YELLOW TULIP (*Hemicyclia australasica*).

A tree in the Kin Kin Rain-forest.



Photo.: Dept. Agriculture and Stock]

PLATE 28.—YELLOW TULIP (*Hemicyclia australasica*).

The twig on left is flower-bearing ; the one on the right bears an immature fruit. The leaf below is from a coppice shoot.

A, dry fruit ; B, hard, inner part of fruit containing the seed.

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THE QUALITY OF QUEENSLAND BANANAS.

The Deputy Premier and Minister for Agriculture (Mr. W. Forgan Smith) made the following statement to the Press recently:—The statement attributed to Mr. Minns, of the Metropolitan Markets, Melbourne, regarding Queensland bananas, cannot be allowed to pass without some comment. His reference to bananas not being fit for pig food is the kind of broad sweeping statement that we are becoming used to from certain sources. The effort that was made by certain interests to prevent Queensland meat being sold in Victoria will be remembered. The Victorian State authorities have ample power under their domestic legislation to protect the public against the sale of any product unfit for human use.

Fruit is a commodity that is perishable in character, and in all markets throughout Australia and throughout the world large quantities have often to be condemned, and, no doubt, occasion for this arises with regard to every product.

Queensland imports potatoes, apples, and other products from Victoria, and quite frequently quantities have to be condemned on arrival here. These things happen in the ordinary course of events, and officers are employed by the Health and Agricultural Departments to protect the public in regard to food values of produce offered for sale. Victoria is a large fruit producer, and the fewer bananas sold in that State the greater demand there would be for their own locally grown products. This establishes a form of interest and causes propaganda to be used similar to that with which we became familiar in connection with chilled meat from Queensland. The Queensland Government suggested to the other States (Victoria included) that they should adopt certain minimum standards for bananas, and in every way we have helped within our constitutional powers to see that only suitable qualities are marketed.

Maintenance of Grades and Standards.

Farmers themselves, in regard to the production of all commodities, should exercise the utmost care in ensuring that grades and standards are maintained, and the highest possible marketing conditions established. It is interesting to note that much of the current public comment synchronises with the attempt by the banana growers' own organisation to establish a more orderly form of marketing which is designed to give the form of control that is necessary to maintain high standards. If this is carried out properly, a marketing and ripening system can be inaugurated which will cause many of the present difficulties to disappear, but in adopting such a system certain people who get a large rake-off under present conditions may be affected; hence the hostile propaganda that is at present being used.

Some Causes of Low Quality.

The reference in leading articles in certain newspapers to taxation and wages is quite beside the point, cutters and packers being the only ones covered by the basic wage in the banana industry, and very few men are employed as wage earners. Surely no one can argue that a protected industry should deny workers reasonable wages standards. The reference in the "Courier" leading article to the average income of banana growers is based on a broad arbitrary generalisation which trained economists would be very cautious in accepting. Time and again this Department has called attention to the causes of the difficulties from the point of view of production. These are—

- (1) The attempt to grow bananas on land not suitable for the purpose;
- (2) The harvesting of bananas on land of depleted fertility;
- (3) Faulty methods of cultivation; and
- (4) Faulty packing and inefficient methods of ripening.

Protect Queensland's Interests.

These phases of the industry can, of course, be unduly emphasised, for a large proportion of banana growers are alive to the position, and are producing and marketing bananas of good quality, and those men are making a fair living. With proper methods of cultivation and suitable land, and with proper marketing organisation, the industry can be stabilised and give a remunerative return to a large section of the population. Newspapers in their comments on this industry should guard themselves against being used for purposes antagonistic to Queensland interests.

Answers to Correspondents.

BOTANY.

The following replies have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Johnson Grass.

W.D.D. (Rosewood)—

Your specimen is the Johnson Grass (*Sorghum halepense*), introduced into Queensland many years ago and highly boomed as a fodder. There is no doubt that Johnson Grass provides a great deal of forage, but its habit of spreading by means of long underground rhizomes or runners renders it a pest in cultivation, and it is generally recommended that where it is desired to use it as a fodder that the field should be devoted to Johnson Grass and to nothing else. The grass is better suited to cutting than to feeding off. Like other members of the *Sorghum* genus ("family"), care must be exercised in feeding, as it contains a prussic acid yielding glucoside which has proved fatal to stock on one or two occasions in Queensland. Therefore, it is best, perhaps, to cut the grass and allow it to wilt for a short time before feeding. The same remarks, of course, apply to Sudan Grass, Imphee, and other members of the *Sorghum* genus.

Specimens Identified.

S.F.L. (Samford)—Your specimens are:—

1. *Smilax australis*. A climbing plant of the family Liliaceæ, belonging to the same genus (*Smilax*) as the sarsaparilla of commerce.
2. *Bæckea virgata*. Family Myrtaceæ. A small shrub common on the creek sides in South-eastern Queensland. It is also found in New Caledonia. The name "Wild May" is, I think, more commonly applied to an allied plant—*Leptospermum flavescens*, with somewhat larger flowers. The name, however, is quite appropriate.
3. *Polygonum lapathifolium*. Family Polygonaceæ. "Smart Weed" or "Water Pepper."
4. *Mollotus claoxyloides*. Family Euphorbiaceæ.
5. *Solanum sodomæum*, the Apple of Sodom or Devil's Apple. A native of the Mediterranean region naturalised in various parts of the world.
6. *Solanum aculeatissimum*, the Devil's Apple. A native of South America now naturalised in many parts of the world.
7. *Mczoneurum Scortechinii*. Family Leguminosæ. Commonly known as Barrister or Wait-a-While; the latter name is applied to a good number of prickly vines.
8. *Homalanthus stillingiaefolius*. Family Euphorbiaceæ. I do not know a common name for it.

Wild Radish or Wild Turnip.

C.H. (Proston)—

Your specimen is *Raphanus raphanistrum*, the Jointed Charlock or Wild Radish, also commonly known as Wild Turnip and by other names. The weed is a common European one that is now widely spread over the cooler parts of the world. It is not known to be poisonous, but like other members of the turnip and cabbage family, if eaten in quantity it will cause hoven or bloat if the animals have fairly empty stomachs.

Dodder.

J.M. (Nanango)—

Spraying infected patches of Dodder with a dip mixture should be successful. Spraying of Dodder in other places has been done with success. This plant can be spread by grazing stock eating the plant containing the seeds, the seeds afterwards germinating; the plant can also be spread by broken parts being carried about from one place to another. It is hard to say how it has got into your place, but the particular sort of Dodder you sent is quite commonly seen as a pest growing over weeds, &c., in paddocks and along railway lines. Keeping the paddock closely grazed or cut would assist in eradicating the Dodder if the plant proves troublesome.

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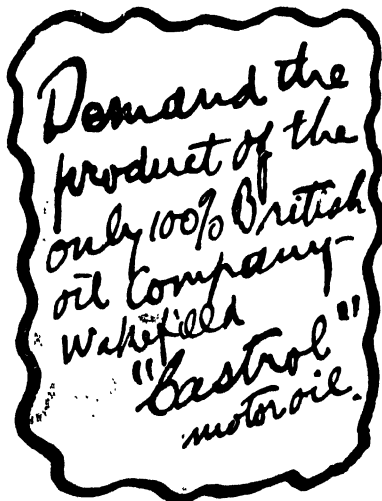
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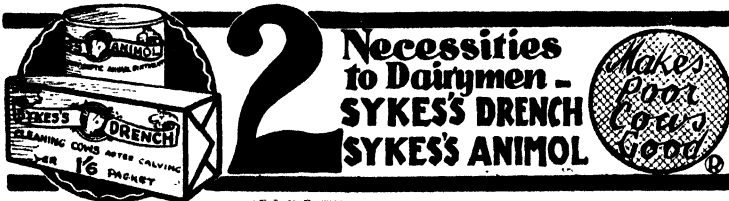
"We have a very severe drought here. I have a great opinion of Vita-Lick to give sheep strength in time of drought. Many of my sheep were in a dying condition about the end of September; up to that time I kept my sheep supplied with coarse salt only. My sheep had a dull sickly look; they were hollow. A lot of them would hang about the water and would not drink properly. I commenced to use Vita-Lick about the end of September. I commenced with one bag of Vita-Lick Concentrated to one bag salt. I kept my sheep well supplied with this mixture and am very pleased. My sheep have now a fresh look; they are all in good health, though most of them are very poor. Vita-Lick has made them all strong. I am an old sheep man and I must say I have never seen sheep so poor with so much strength on drought stricken country. Had I continued to give sheep salt only, many of them would be dead by now. I WISH I HAD KNOWN THE VALUE OF VITA-LICK IN THE 1926 DROUGHT."

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FORAGE POISONING IN ANIMALS.*

SYMPTOMS AND CAUSES.

Though forage, or fodder, poisoning is microbial in origin like anthrax, tuberculosis, &c., it differs from those diseases in that it is not necessary for the microbe to attack the animal directly; that is, to invade its body. The microbe is in the feed, and it is there that it does its deadly work (states a bulletin written by Dr. H. R. Seddon and Mr. G. Edgar, and issued by the New South Wales Department of Agriculture). The microbe, moreover, does not cause any disease in living plants, but attacks them only after death, usually growing and multiplying with the microbes that produce decomposition.

The particular microbe that causes forage poisoning is *Bacillus botulinus*. Four distinct types of it are known to exist, and while the symptoms produced by all are identical, differences exist in the poison produced by each type. Horses are most commonly attacked, because they are fed more on prepared fodder than other animals. However, cases in cattle are by no means uncommon, and even sheep and pigs may be affected at times.

Inability to swallow food is the most important symptom of the disease, and one on which chief reliance is placed for diagnosis. As might be expected, there are various degrees of poisoning, depending on how much toxin the animal has absorbed. The acute type follows on the taking into the system of a large quantity of poison, and its onset is sudden and course rapid. Careful observation will reveal listlessness, slight inco-ordination in gait and clumsiness in eating. Then follows the typical symptoms of "paralysis" of the tongue, and the muscles which perform the act of swallowing, salivation being marked at this stage. The duration of these symptoms varies. Sometimes they are manifested for several hours, even a day or more, but in others they may be of much shorter duration, and particularly if they occur at night, or at other times, when the animal is not under close observation, they may escape notice altogether.

Following the paralysis of the tongue and throat, the animal loses co-ordination of the limbs, and usually soon goes down. This may, in fact, on account of the non-observation of earlier symptoms, be the first thing noticed in very acute forms of the disease. There are no manifestations of pain, but the animal struggles ineffectively to regain its feet, these efforts ultimately passing to a paddling action with both the fore and hind limbs. This action is not continuous, but occurs at somewhat frequent intervals after the animal goes down. Affected animals are usually constipated, owing to a certain degree of paralysis of the muscles of the walls of the bowels. The temperature is usually lower than normal, except in cases where the animal becomes distressed to some extent from struggling, but it is never high. Respirations are slower, but the pulse rapid. Affected animals may lie on the ground for one to three or four days, depending upon the amount of poison (toxin) that has been absorbed. Finally, however, death supervenes, the animal being conscious almost to the end.

A chronic form of the disease has been termed "sleepy staggers," and such indicates very clearly the symptoms shown by an animal. It is dull and listless, and shows a distinct disinclination to move; when made to do so, it is noticed that the gait is laboured, the feet not being lifted clear of the ground, and the step is short. Salivation and nasal discharge are fairly profuse, and though swallowing is extremely difficult it is not entirely suspended. The animal is able to swallow small quantities of food provided it is moist, but has great difficulty in swallowing dry food. Mastication is extremely slow, and a proportion of the food drops from the mouth. Animals suffering from this form may live for weeks and gradually waste away, the abdomen assuming a pronounced "tucked-up" appearance. A very small number of chronic cases recover, but convalescence is very prolonged. It must be emphasised, however, that all stages intermediate between the acute and chronic types of the disease may occur.

It is said that any kind of fodder may at times be infected with the microbe, and though it may be found in pastures as well, the experience in Australia is that in the great majority of cases, animals which have been fed on some form of conserved fodder—hay, chaff, grain, or silage—are affected. It is found, however, that certain of these fodders are more liable than others to be dangerous, and to realise why this should be it is necessary to review what is known of the causal microbe; where it is found, how it may get into fodder, and how it grows and produces its poison therein.

* From the "Pastoral Review" for October, 1928.

The microbe may be found in soil, dust, or water, and ordinarily lives therein, gaining its nutriment from dead (decomposing) vegetable material. It is not capable of directly attacking plants or animals in the living state. The writers of the bulletin state that no exact knowledge is available as to how common it is in the soils of New South Wales, but such examinations have been made in other countries (and are being made in Australia), and give grounds for the belief that it is far from uncommon. This is supported by the fact that cases of the disease have been met with in recent years in the Young, Warren, Coonamble, Gundagai, Murwillumbah, Inverell, Riverina, and Narrabri districts of New South Wales.

Being in the soil, the microbe easily gains access to such fodders as hay, chaff, and silage, per medium of the dust raised from the surface soil. It then requires suitable conditions of moisture and warmth in order to multiply. The microbe is microscopic, and even when multiplying in fodder does not produce any recognisable changes. Conditions which favour its growth, however, also favour the growth of other micro-organisms, particularly moulds, and thus it is frequently found growing in mouldy fodder. This, however, is not entirely a chance arrangement, for whereas ordinarily this bacillus can grow only in the absence of air, it can grow in fodder exposed to air if it has a mould growing over it. Thus mouldy fodders are more liable to contain the microbe and be dangerous.

Silage is specially liable to be attacked, owing to two factors—(1) its high moisture content, and (2) its liability to become mouldy. As is well known, a well-prepared pit or silo of silage shows no mould through the greater part of the stack, but only on the surface, and it is just this mouldy surface layer which is liable to be dangerous. If silage be exposed, however—particularly if a pit be opened and exposed to the weather—the exposed part, previously sound, becomes mouldy, and, if it has been contaminated by soil containing the microbe, is liable to contain the poison and to be dangerous. The point is that good, wholesome silage is not likely to be harmful. Damaged mouldy ensilage may be dangerous, and should not be fed.

While closely-cropped grass is not likely to be dangerous, tussocky grass, particularly the rank growths found near creek beds or on inundated land, may easily contain much dead material, both leaf and stalk, and such clumps may be somewhat damaged and mouldy about the butt. Also in harvest fields, where winnowing is carried out in the paddock, the site of the winnowing operations may be a danger spot. When rain has fallen the sprouted grain is readily sought by any animals which may be grazing in the paddock, and as they nose about in search of it are likely to gather some decomposing harvest refuse. Such material offers most suitable conditions for the multiplication of the poison-producing microbe, and there are several cases on record of the disease having been contracted under these circumstances.

There are two other facts concerning the poison that must be borne in mind—namely, that among poisons it is ranked as one of the most powerful, and that it is soluble in water.

In consequence of the latter it is easily washed from that part of a stack where it was produced to some other part, and thus it may be found that fodder which appears quite sound itself may, by having been overlaid with damaged fodder and exposed to rain, have had sufficient of the poison washed into it to cause the disease. A further point is that as the poison is so powerful, sufficient to cause mortality may be produced in small "pockets" of mould in the fodder, such pockets being so small and infrequent as to be easily overlooked.

It is not always possible to determine how the fodder has become harmful, and frequently it is impossible to detect the microbe in the suspected material. The issue is further complicated by the fact that in common with other bacterial poisons, but unlike such poisons as strychnine and arsenic, this poison produces its effects only after an interval of some days, usually three to seven. Thus, it is not the feed the animal ate the day before it became ill, but that eaten a week before, that contained the poison.

In the absence of any reliable means of telling if fodder is infected with the microbe or otherwise, owners of stock should, as far as possible, see (a) that only sound stuff is fed, (b) that where fodder is badly damaged, such damaged portions are burnt, and (c) that in order to minimise such loss of fodder, proper care is taken in the protection of stacks, &c., from (1) the effects of wet weather, and (2) attacks by mice.

At the present time there is no method that can be relied upon for the successful treatment of affected animals. It is possible to immunise animals against the condition by means of an antitoxin, but such is very costly and the immunity of short duration, and, with the disease affecting such comparatively small numbers of animals, and being of uncertain occurrence, immunisation is not a practical measure for the control of the disease.

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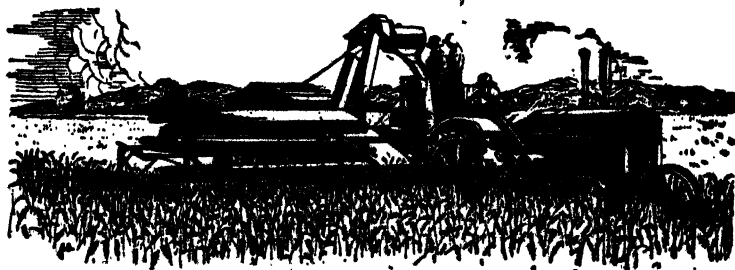
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THE PRACTICAL APPLICATION OF METEOROLOGY TO AGRICULTURE.*

WEATHER FORECASTS—CLIMATOLOGY—WIRELESS ON THE FARM.

The progress, attained since the war, in the technique and distribution of weather forecasts, and in the use of meteorological apparatus adapted to agricultural needs, has convinced the rural population of the older countries of the advantages which they can derive from the two principal branches of meteorology—weather forecasting and climatology.

Since its formation, in 1921, the French National Meteorological Office has seen, each year, a growth in the demand for information on the part of agriculturists, viticulturists, horticulturists, agricultural syndicates, &c. For the first time in France, the establishment of a close collaboration between agriculturists and meteorologists is in a fair way towards realisation. Meteorologists now know exactly what is required by agriculturists, who, in their turn, know more precisely what they may expect from meteorological science.

The subjoined account of the way in which meteorology is applied to agriculture in Europe is therefore of especial interest to Queensland farmers.

I. WEATHER FORECASTS.

Principles of Weather Forecasts.

FORE-KNOWLEDGE of the weather of to-morrow and the following days is of the utmost interest to the farmer, especially in certain seasons. The question of weather forecasting has occupied the attention of agricultural circles from remote times, though it was not until the second half of the nineteenth century that it was solved scientifically. In 1857, the French astronomer, Le Verrier, concluded that it would be possible, from daily meteorological charts, to predict some hours in advance the arrival of atmospheric disturbances, and, in consequence, probable changes in weather. The principle of scientific forecasting of weather has made much progress since that time. Wireless, in particular, has allowed the construction of more complete charts, through rapid centralisation of observations, not merely from the whole of Europe and Northern Africa, but from ships at sea, especially those in the Atlantic. This last information has the immense advantage of giving information of the arrival of disturbances from the Atlantic, to which France is specially exposed by reason of its geographical situation on the West of Europe.

There were three principal stages in the successive improvement of the technique of weather forecasting—

- (1) Up to 1914, forecasts were based almost exclusively on the examination of isobar charts. These charts show the zones in which pressure decreases from the outside to the centre (depression) or increases from the outside to the centre (anti-cyclone). The track of depressions or anti-cyclones can be followed on charts drawn up every 12 hours; their position 24 hours later can be deduced, and, in consequence, the weather they will bring to the district under consideration can be forecast. These deductions, unfortunately, are not always correct. The movement of depressions which, in general, takes place from west to east is not always very regular. The track curls and turns back, the speed is variable and, like that of anti-cyclones, the track is influenced by many factors. It is the resultant of all these factors which determines the movement of pressure centres, and the difficulty of forecasting will, therefore, be understood.
- (2) During the war, this method was improved by adding to it the method of barometric variations. There are drawn on charts, lines of equal variations, that is to say, lines passing through all the points at which

*Translated and summarised by Mr. W. R. Black (Ministry of Agriculture and Fisheries, U.K.) from an article by Mons. J. Sanson (Chief of the Climatological Service of the French National Meteorological Office) in "La Grande Revue Agricole," March, 1928, and reprinted from "The Journal of the Ministry of Agriculture," (Great Britain) for October, 1928.

barometric pressure has varied to the same extent during the determined period. These lines show zones of increase or decrease and their track is much more regular than that of depressions or anti-cyclones which they accompany and their speed is fairly constant in each season. A study of their evolution furnishes valuable indications for the forecasting of isobar situations.

- (3) There is a striking connection between the zones of variation of pressure and cloud systems. The study of cloud systems is the latest improvement made in the meteorological services of France for weather forecasting. If cloud charts are drawn up it is seen that clouds are grouped in large extended masses which are well-organised and move in a system known as the cloud system, which has four parts: (a) A front composed of high clouds partly covering the sky. This first part heralds the approach of a zone of low pressure. (b) A centre formed by a uniform veil of clouds of average height accompanied by low clouds giving continuous rain. This centre coincides with the zone of low pressure itself. (c) A tail with the sky alternately almost clear and very cloudy from the debris of clouds at all heights, giving a succession of showers, storms and fine weather. This tail accompanies the arrival of the zone of high pressure. (d) On the borders of this system, there are margins in which there are only high or average clouds. Cloud systems move most often in a series coming from the south-west, from the west or from the north-west. In the interval between two cloud systems the sky is clear or has local clouds which appear in the morning and disappear at night, but continuous fine weather is only experienced in general in zones of high pressure which are not touched by zones of variations.

It is by the combined study of isobar charts, charts of variation in pressure, and charts of cloud systems that rational forecasts of weather can be made.

Distribution of Agricultural Warnings by Wireless.

Once these weather forecasts are made out, they must be brought to the notice of agriculturists as quickly as possible. Great progress was made in this direction in 1922, when the National Meteorological Office began to distribute its bulletin four times a day by wireless from the Eiffel Tower. These warnings contain, for each of the 12 regions into which France has been divided for the purpose, information on the general character of the weather, wind, rainfall, temperature, and the possibility of dangerous phenomena for agriculture—such as frosts, storms, hail, &c.

Since August, 1927, a further improvement has been introduced into the distribution of these agricultural warnings. The Compagnie Française de Radiophonie decided to issue each day, at 7 p.m., an agricultural meteorological communiqué specially adapted to the needs of farmers in the north of France and in the neighbourhood of Paris. This communiqué is drawn up by a group of agricultural experts and practical agriculturists with a high reputation in agricultural circles. They are in daily contact with the forecast service of the National Meteorological Office, and are thus kept in touch with all modifications in the weather situation revealed by the charts mentioned above. Being in full possession of all the facts, they can make such comment on the forecasts drawn up by the National Meteorological Office as will be of use to the rural population, and draw conclusions enabling the latter to employ their time to the best advantage on the morrow (e.g., in cultivations, ploughing, manure-spreading, irrigation, harvesting, &c.). The commentators also report on the need for preventive treatment when the atmospheric conditions are favourable to the development of fungus diseases, or for protective treatment when there is a likelihood of frosts, or for increasing the dressings of certain manures to counteract excessive humidity or drought; the commentators also give advice of a more general kind adapted to the climate of each region—for example, the use of a certain variety of wheat or the possibilities of a catch crop. In short, they give agriculturists, in an assimilable form, the means of drawing the maximum profit from the weather forecasts of the National Meteorological Office.

This innovation could not have been better received in rural circles, and it is hoped, as a result of this initial success, that it will not be long before the regional stations of the National Meteorological Office are provided with sufficient staff and material to enable them to participate in this service. Farmers in all parts of France could thus benefit from communiqués specially drawn up for their respective regions by meteorologists who know the local climatology well, and who work in the closest collaboration with practical agriculturists of the country.

II. CLIMATOLOGY.

(a) General Application of Climatology in the Improvement of Crops.

Weather forecasting is not, as generally thought, the only branch of meteorology which can be useful to agriculturists. There is a second—Climatology—of which many agriculturists are unaware, which can, however, render them considerable service. A precise knowledge of climate, that is to say, of the meteorological elements not solely of the air in which we live, but of the air at the surface of the soil and in the soil, can play a capital part in agriculture for the following reasons:—

- (1) It will help to increase yields by facilitating the choice of varieties of crops best adapted to the climate; varieties resistant to cold in the east, or drought in the south; early varieties in regions where the heat of July causes "burning" to be feared; varieties of which the critical periods (earring of cereals for example) coincide to the maximum of probability with favourable meteorological phenomena.
- (2) It affords a powerful aid in the application of preventive treatment against fungus diseases. Two kinds of conditions are needed for the development of these diseases, those favourable for the fungus and those predisposing the plant to disease. High temperatures, drought, and a high exposure to sunlight are factors propitious to fungi attacking the plant, which is already weakened by a partial withering of its tissues; they form, on the contrary, a powerful obstacle to the development of the propagative organs of the fungus, whose existence they menace. On the other hand, a soft and humid weather favourable to the fungus produces the maximum of turgescence in the tissues of the plant, which is thus better able to resist fungus attack. In order to produce an epidemic it is necessary that these two opposite kinds of conditions must immediately succeed each other, leading, in the first place, to predisposition of the plant to attack, and then to the development of the fungus before the plant can react. Thus at the beginning of the warm weather the plants wither in the day time; now if, in the course of the night, temperature is lower and a mist is produced (an element propitious for the propagation of fungus spores) the fungus attacks the plants, which will not have had time sufficiently to regain their turgescence and the epidemic will break out. On the basis of these data, and from the observation that potato blight always travels from west to east, one can, in certain conditions of temperature and humidity, and with observation posts judiciously placed, announce the probable advance of this disease in a given region and advocate the necessary preventive treatment.
- (3) It will sometimes allow measures to be employed to counteract certain atmospheric phenomena which are particularly dangerous at certain times of the year—use of artificial clouds against spring frosts, formation of societies intended to prevent or insure against hail.
- (4) It will assist the rational use of manures. It is known, for example, that lack of water in arable soil impedes nitrification. In very dry regions the extensive use of easily soluble manures may remedy this to a certain extent. In districts with abundant rainfall, where fungus diseases and storms are particularly to be feared, dressings of potassic and phosphatic manures will be increased. These same manures will induce vegetative activity in regions where winter cold and spring frosts lead to the risk of damage to advanced crops. The climatology of the country will be also utilised to fix the dates of spreading manures; for example, the application of potassic manures will be the earlier the drier the climate, that of nitrogenous manures on grass will be carried out as far as possible on dry days at the end of February when rain is imminent. Liming and marling will be done in the dry periods of autumn.
- (5) It is indispensable when new crops are tried. Thus, in France, an increase in the area under sugar beet is very desirable. Before this crop is grown in certain departments, their climatology must be known; in particular, whether the distribution of average quantities of rain over the summer months will permit of the advantageous acclimatisation of this crop. Sugar is produced as much through the water in the soil as from the carbonic acid in the air. Evaporation from the leaves of beet is considerable, and may reach 350,000 to 500,000 gallons of water per acre, corresponding to a rainfall of about 20 in., which must be spread over half a year (May to October). It must be ascertained, therefore, that the rainfall can satisfy the need of this crop for water.

- (6) Finally, certain meteorological data can be instanced which are of service to agriculturists, e.g., the monthly and annual distribution of rainfall and the amount of maximum falls in the case of the construction of cisterns; the system of winds in the case of the installation of a mill or an air-wheel; and extremes of temperature, duration of frosts and their intensity, in the case of heating in glasshouses.

(b) Study of a Particular Climatological Factor, e.g., Influence of Rain in Agriculture.

Among the climatological phenomena having an important effect on agricultural production, rainfall seems to take first place, and it seems useful by way of example to study, in some detail, the role of rainfall in agriculture. The amount of rainfall is expressed in inches, a precipitation of 1 in. corresponding to 4.7 gallons of water (i.e., 47 lb.) per square yard, i.e., 22,500 gallons per acre. In France, the average quantity of rain received annually varies according to district, the minimum in the neighbourhood of Paris and the maximum in the neighbourhood of the mountains.

Fertilising Effects of Rainfall.—The physical and chemical effects of rainfall are well known. Minerals in the soil are rendered soluble, without which they cannot be utilised for the formation of plant tissues. It is, also, through rainfall that fermentation indispensable to plant life takes place in the soil. There is one point to which particular attention must be called, namely, the fertilising effect of rainfall due to the ammoniacal or nitric nitrogen which it contains in quantities far from negligible. Determinations carried out in France and Belgium have shown that rain contains, on the average, .0002 per cent. of ammoniacal nitrogen and .00007 per cent. of nitric nitrogen. Winter rainfall is, in general, richer in nitrogen than summer rainfall. It is seen that rain brings in an average year some 13 lb. of nitrogen per acre in the region of Paris and more than 26 lb. in the wetter districts of the country. In Germany and in Italy, the average quantity of nitrogen brought per acre by rainfall has been found to be about 10 lb., and in England about 7 lb., of which three-quarters are ammoniacal nitrogen and one-quarter nitric nitrogen, while, in the United States, it is as large as 20 lb., of which 13 lb. are ammoniacal nitrogen and 7 lb. nitric nitrogen. Rainfall is about 10 times richer in nitrates in tropical regions than in temperate climates. The proportion of ammonia is also much higher, which explains the luxuriant vegetation on certain African soils which, from their composition, would be considered as poor. These quantities of nitrogen furnished by rain are much superior to those given in manures, especially in France.

Thus, in some degree, rainfall supplies manure, but the reverse is sometimes the case, and manure can, at least in part, replace water. In order, for example, in the case of wheat, for the plant to manufacture 1 gr. of dry matter it has been established that 0.53 pints of water are necessary in unmanured soil and only 0.35 pints in the same soil with average manurial dressings. The transpiration of cereals is, in fact, diminished by the use of manures, and, varying with the dressing of the latter and the nature of the soil, the quantity of water required to produce 33 bushels of wheat per acre, weighing 71 lb. per bushel, has been reduced from 24 in. to 8 in.

Disadvantages of Excessive Rainfall.—(1) Potash salts are retained by the absorptive power of the soil and suffer only insignificant losses from rainfall. No loss is to be feared so far as concerns soluble phosphatic manures. It is different, however, with nitrates, which are in danger of being lost in drainage water through abundant rainfall in autumn and winter. This point must, however, not be exaggerated. The loss of nitrates in the sub-soil is much less rapid than is often imagined; thus after a rainfall of half an inch, it was found that nitrate only descended a few tenths of an inch in the soil, while the humidity produced by this rain falling on a dry soil had penetrated in one day to 2½ in. Further, in warm weather nitrate may be brought back quite quickly by capillarity from a considerable depth to the surface. Nitrate 10 in. deep in the soil was thus returned to the surface in a fortnight. During this season, capillarity causes the water in the soil to rise to replace that lost in evaporation. This water brings with it dissolved products deep in the soil, products which thus come to be concentrated in the neighbourhood of the roots of plants. Too deep a burying of nitrates following rain need not be feared when the manures are applied in spring, even if they are ploughed or harrowed in. As, however, nitrates are subject to denitrification in very humid soils, it is advisable, where too heavy rains or a high humidity are to be feared, to replace nitrates by ammoniacal manures. Sulphur, and, above all, lime, are lost through rainfall in larger quantities than any other manurial element. Losses of lime, naturally more important in a rainy climate than in a dry district, attain on the

average in France 3 to 4 cwt. per acre per annum; in very rainy years they have even reached 4½ cwt. The practice of liming is, therefore, absolutely necessary, as lime is an indispensable element in the nutrition of plants equally with nitrogen, phosphoric acid, and potash.

(2) Soils which are too wet, i.e., which contain more than 40 per cent. of their weight of water, are, in general, impermeable to air, and thus any gaseous exchange between the soil and the atmosphere is rendered impossible. There results a stoppage of respiration of plant roots, leading to asphyxiation of the plants and a lowering of the temperature of the soil harmful to their growth. The water (which is a bad conductor of heat) remaining in the top layers of the soil is not replaced by air, and, in consequence, these layers, although superficially warm in spring, cannot transmit this warmth to the lower layers, which remain cold. There results, among other things, from this lack of warmth, the impossibility of production of carbonic acid gas in the soil, an indispensable element in the development of the plant, as a complement of carbonic acid gas in the atmosphere. Soils which are too wet lack air and are cold, but it is possible by drainage to aerate and warm them. Experiments have shown that the average temperature of a drained soil can be 6 deg. C. higher than that of an undrained soil.

(3) The substances necessary for the nutrition of plants, concentrated in the neighbourhood of the root hairs, penetrate these latter with the soil water by capillarity and endosmosis and ascend through the plant cells under the impulse of these forces. Their ascension and their absorption are considerably increased by transpiration, which leads to the consumption of an enormous quantity of water compared with that strictly necessary for the tissues. Thus fertilising elements from the soil reach right to the leaves. If the soil is too dry, transpiration is greater than absorption and plants wither, but, if the soil is saturated, the plants are "gorged" with water and their vegetative apparatus is developed to the detriment of their reproductive apparatus. In this latter case, in effect, the substances in the soil are diluted to too large a degree with liquid, and, since the roots can only absorb a certain volume of water, the plants are deprived of a certain amount of their nutrients, notably phosphates, without which it is impossible for them to live normally. On the other hand they have other nutrients at their disposal in greater quantity, particularly nitrogen brought down in the rainfall. There results an exaggerated growth of the vegetative organs, a diminution of precocity, and a marked tendency to the invasion of fungus parasites. This can be remedied by increasing the potassic and phosphatic dressings.

(4) The year 1927 showed once more that, while abundant summer rain has not always a bad effect on the quantity, it has on the quality of the crop. For wheat, in particular, it has been established that rain at harvest does not lead to the germination of the grain in the sheaf unless accompanied by a sharp fall in temperature such as is produced at the time of a storm. Such fall of temperature is not an obstacle to germination as one would be tempted to think, but, on the contrary, the determining cause. The damage to the crop is the greater the longer the temperature remains below the normal after rainfall; and inversely the damage is the smaller the more rapidly the thermometer regains the average for the season. In regions where rainfall is abundant during the months of July and August, it is to the interest of farmers to select varieties of wheat which are resistant to this special effect of summer rains.

Correlation between Rainfall and the Yield of Wheat.

The preceding considerations show the important part played in agriculture by rainfall. It has long been known (it is found for instance in the Bible) that harvests are intimately dependent on rainfall. For the central region of France, in particular, the following rules have been drawn up on the relation between rainfall in the quarter April, May, June and the yield of the wheat crop:—

- (1) If the rainfall during these three months is below average, the yield will be above average so long as the temperature is not more than 1 deg. C. above the average. If the temperature is more than 1 deg. C. above average, the crop is damaged by burning.
- (2) If the rainfall during these three months is above average, the yield of wheat is below average.

Analogous conditions have been found in the north of Italy and in Ohio, where a diminution of rain in the spring is accompanied by an increase in the yield of wheat. On the contrary, in the south of France and the southern part of the Italian Peninsula, the effect of rainfall is quite the opposite.

III. RADIO METEOROLOGICAL INSTALLATION OF AN AGRICULTURAL HOLDING.

The preceding considerations suffice to show the importance for the agriculturist on the one hand of the reception of short-term weather forecasts, and on the other of a knowledge of climatological elements not only for his region, but also for the precise spot where his holding is. He can thus take account of the repercussion of atmospheric factors on his crops and seek for means to diminish the disastrous effects of certain of them.

It is indispensable in the first place that wireless receiving sets should be multiplied in country districts, for agriculturists can thus receive, beside the regional weather forecasts sent out each day at a fixed hour, special warnings of atmospheric conditions favourable to the development of fungus diseases, of spring frosts, or of particularly violent hailstorms.

In the next place, every important holding should have besides a barometer, the variations of which will complete the forecast data, a small meteorological installation comprising several simple pieces of apparatus which stand rough usage, which cost little, and which give sufficiently precise data. Until 1927, such instruments did not exist. This regrettable gap has now been filled by the National Meteorological Office on the demand of a seed selection society in the Paris district which desired to possess a meteorological station; and at the present time agricultural meteorological "posts" on that Office's model are being multiplied throughout the country. The installation comprises:—

- (1) A screen of very small dimensions containing maximum and minimum thermometer, psychrometer* and evaporimeter.
- (2) A rain gauge.
- (3) An actinometer for the determination of the intensity of solar radiation, and sunshine recorder.
- (4) An outside evaporimeter to determine evaporation at the level of the plant.
- (5) A maximum and minimum thermometer placed a few centimetres above the soil in order to obtain the temperature at the soil level.
- (6) A soil thermometer to measure the temperature at 40 cm. depth.
- (7) Three special soil thermometers to determine the temperature of the soil at depths of 30 cm., 60 cm., and 1 metre.

The whole of this apparatus costs about 1,500 francs (at present, £12), but for many agriculturists a smaller installation would be sufficient; that employed in the Department of Seine-et-Oise, with the collaboration of the Meteorological Commission of that Department, may be instanced as especially interesting. On a dozen holdings there has been installed a meteorological "post" comprising only a rain gauge, outside evaporimeter, maximum and minimum thermometer to measure the temperature of the open air at a few centimetres above the ground, and a soil thermometer at 40 cm. depth. A meteorological post, composed of these four pieces of apparatus, gives very complete information on the temperature of the air and the soil in the layers affecting plants, as well as of rainfall and evaporation—which are two phenomena which ought not to be separated. The price is only 200 francs, since rain gauges are generally lent free by the Departmental Meteorological Commissions to persons who express the wish to have them, the only condition imposed being that they undertake to carry out observations regularly every day and forward a summary every month.

*A combination of two thermometers, the bulb of one of which is coated with muslin kept moist with water. The difference in the readings is used in the calculation of the humidity of the atmosphere.

A PRACTICAL HANDBOOK.

Thus a Columboola farmer:—"Keep on sending me the Journal, for which I enclose 8s. as subscription for another three years. I regard the Journal as a useful and practical handbook."

THE CULT OF THE COLT.*

By "U9L."

IV.

DRIVING—LEADING—MOUNTING.

We've handled the colt to our heart's content, and perhaps bored him with our ceaseless attentions; we've picked up his feet repeatedly till the poor chap's doubtless wondering what it's all about, and on the near side and the off have we moved freely till the colt doesn't know which way we're coming at him. We've led him about till he almost regards himself as part of our shadow, and between us we've formed a bond of friendship. Now we'll drive him in reins. Some people prefer the roller for this, running the reins through the rings on it, but I fancy the old saddle once more. You see, the saddle is his companion for life, and he's got to get used to it. If you tie a strap loosely under his belly, each end of that strap attached to a stirrup iron on either side, that will keep those irons in place. And if you run your driving reins through those irons it keeps the reins down and serves even better than the rings on the roller. See? And though it doesn't serve any special useful service, it's not a bad plan to have those same old flapping bags decorating the colt even while we drive him in reins. It all helps to civilise him. Let's drive him.

Some breakers like great long reins, things reaching from here to there. I don't know why, but many of them do. I like reins as short as they may be so long as they allow me room to stand well clear of the colt's rearguard attentions, should he have any inclinations in that direction. You see, those reins are a dead weight on the colt's mouth. The longer they are the heavier they are. No matter how lightly you try and handle him, with those long reins, it's a leaden drag on the youngster's jaw, and that isn't good for his future perfection, if he is to have any. However, take your choice. I've known breakers drive their colts all over the place, through gates, into the garden, round by the stables, under the clothesline, and up to the kitchen door. I've heard that acclaimed, too, as being the mark of the good breaker. It's certainly painstaking, if nothing else. In fact, I'm prepared to say without reserve that it creates a good impression in over 90 per cent. of cases when a breaker drives his colt good and plenty. I'll go further than that and state it creates too good an impression—on the colt! It doesn't matter how light you may be in the hands, or what delicacy of touch is yours, you can't preserve that daintiness over a long length of driving rein. I've seen, and so have you, a breaker driving his colt about the house, looking round with that self-satisfied smirk so apparent in many men, and veritably he's longing for someone to step out with a camera. And all the time there's nearly half that 30 feet of driving reins dragging on the ground. Tell me, and be impartial when you make judgment, is that sort of thing conducive to a light mouth in a colt? And then tell me if you regard a light mouth as a thing to be desired. When I say "light" I don't mean giggle-headed, please bear in mind. "Light" means responsive, which is, or which should be, the point at which we aim. Having said that much, you'll now be prepared for me to make the revolutionary statement that I don't believe in excessive driving in reins. I don't! I'll do a few figures of 8, teach the colt to stop and start a few times, and I'll undertake to say I won't spend more than a quarter of an hour on the driving process, not wasting one minute of it, and I'll do my mouthing, and do it lightly, when I'm on the thing's back. I have finished, even though I've told you more of what I dislike than of what is to be done.

Be Prepared for Quick Action.

Now, straight on top of his driving, and while the impression is still fresh on him, we'll lead our colt on horseback. This has to be done some time, and the advantage of doing it before we ride him is to accustom him to a man being on top of him, if only by proxy, as it were. This is where the work of our old coacher is necessary, and this is where that wise old horse, having an inkling of what is coming, tries to hide himself or play some other trick in an attempt to dodge his work. From the horse's point of view, it's a rotten job. We leave the old saddle and all the other gear on the youngster, and in place of the bridle we slip a halter on his head. Then we pull him up beside the coacher, on the off side of him, of course, and pass the shank of the halter under the coacher's neck. Bear that in mind, will you, as it gives you an added leverage out of all proportion to what it would appear to make.

* From the "Pastoral Review" for June. Previous notes on this subject, by the same interesting and well-informed writer, were reprinted in the March, August, and October (1928) Journals from the February, April, and May (1928) numbers of the "Pastoral Review."

Take the shank under your coacher's neck from the off and bring it up his near side to where you'll take it in your hand. As soon as ever you swing on the old horse the youngster will bound away. He can't help it. He's not used to having a mounted man right on on top of him, and he's not yet accustomed to us appearing from nowhere all of a sudden. That's just hinting delicately it's a wise move to be prepared for quick action as soon as you swing on the old horse, and also to be brisk in changing and holding the shank.

Five Minutes' Fight.

But, bless you, that colt isn't frightened for long—not if our other work on him has been good, anyway. He'll strain back a bit, prick his ears, look up at us and snort. But he'll soon know it's a friend he's used to who's on top of the coacher, and though he mightn't come willingly he'll come to you if you've taught him good work in the leading exercises. Away you go. You don't! As soon as you move on the coacher the colt tries to pull away. Bear in mind, will you, that the whole of the colt's life to the present has been one incident after another to teach him to run from a mounted man. You've got to break down his instinctive dislike, his life's training, and his desires—that's the little task waiting you in teaching a colt to lead on horseback. The wonder is, really, that a man can do it at all. But after two bits and a little more that colt comes confidently to the side of the old horse, and if you do your work well and with judgment and tact it's running freely beside you, extending the glad hand of friendship as it does so. Five minutes' fight, ten minutes' pride and pleasure—that's the first lesson epitomised. You lead him round the big yard, out in the open if you wish—though I always leave that till later, and then you have him standing beside you. This, apart from teaching to lead, is the real object of the first lesson.

As the colt is standing beside you, and moving your old coacher over on to him as he tries to edge away, you lean over the youngster and rest some part of you, if it's only your hand, on his saddle. Gradually you become more familiar and lean right over, slapping him down the ribs on the off side, and then you lift your right leg free and throw it over the colt's back. He mightn't take all this lying down and in an even spirit. But you're on top of the old horse, you're safe, and all you're trying to do is to let the colt know that it's quite the proper thing for a horse to have a man on top of him, that it's done in quite the best circles, and that you're merely introducing the thin edge of the wedge of horsemanship. You keep adding familiarity to intimacy, and shortly the colt doesn't mind what you do, so long as you do it quick and keep within the bounds of reason. Our object achieved, we take him to the round yard again and prepare for the next lesson.

Use of Martingale Condemned.

This time when we take off the old saddle, it and the colt may kiss each other a last farewell—they're divorced for ever. We put on our proper saddle now, one with good gear all through, and we're particularly careful as we saddle him that the thing rides right, that the girths are as they should be, and that the crupper is just so. Part of the breaking process is that a colt must stand a crupper, and though it may never be used again it's got to go on regularly while he's attending school. A breastplate's not a bad idea, though I see little use in it if a horse is shaped within reason at all, and I won't hold with a martingale. No, sir! If a man's hands are so bad that he can't keep a horse's head down then it's better for him to go and play marbles than get in his own road and spoil better horses than he is a man. That's my idea, which may, or may not, be right. A martingale destroys the delicacy of touch, forces a horse's head in an unnatural position, and in its own way it also destroys a rider's hands. Thanks, all the same, but I'd sooner not have one if you don't mind. A man may please himself about single or double reins on his bridle, about the type of sureingle and other portion of his gear. There's only one axiom: let them be strong and clean, and there are a dozen maxims which laud simplicity.

Use of Spurs Evidence of Bad Horsemanship.

Spurs? Positively and finally, once for all and for ever. No! Spurs may, or they may not, be necessary at some later stage of the colt's life. But the man who dons spurs when first riding a colt is a fiend, an idiot, a murderer in embryo, and a thing unfit to mix in decent company and with horses. Honestly, I don't know why a man should ever use spurs. That is, provided he always rides his own breaking. To a horse accustomed to spurs, they're more or less necessary, particularly on a cattle camp, but for ordinary work, and a man riding a horse which is his for a number of years, then I always look on spurs as being a reflection on the lack of horsemanship of the rider. We'll have another word of two to say about those abominations later. Now we'll get on with the colt.

Prepare to Mount!

In what yard are you going to mount him? We each have our individual fancies, and I prefer the big yard. The only reason I take the yard at all is because the colt isn't yet mouthed properly. I've never yet mouthed a reputedly bad horse to ride it in a yard, preferring the open, and for the same reason I like as much space as possible round me when I get on the colt. Let's mount. The youngster is standing there, so burdened with new experiences that its brain's in a whirl and its content to take whatever might come next, accepting it as part of the regular routine. After putting the reins over its head the first thing to do is to follow the golden rule: stand in close. Get in till you're hugging its shoulder with your body, gather the reins in your hand, not too tightly and yet so you have command of them, place your foot in the iron, your knee in its shoulder, a grip of the pommel, and on you swing in one movement, and not in a jerky progression of uneven propulsions. Come back and do that over again, will you? This isn't any attempt to break the speed record. This is a steady mount we're practising. We want to accustom the colt to us climbing on his back, and we want to do it as carelessly as possible while yet preserving a margin of safety for ourselves.

SOME USEFUL TREES.

Here is a brief list of useful shade and fodder trees of value to the stockowner:—

Wilga (*Geijera parviflora*).—A small tree widely distributed in western areas, especially on red soils and heavy alluvials. The trees are shapely and ornamental, being usually trimmed round the bottom by sheep. They make excellent shade trees, and are very hardy and drought-resistant.

Rosewood or Boonery (*Heterodendron oleaefolium*).—A small to medium sized tree, but sometimes little more than a shrub. At times there is a danger from poisoning, especially when the leaves are wet with dew or rain. Very hungry sheep should be fed with caution, and if possible other material fed as well. Some cutters adopt the practice of lopping a day before feeding, thus reducing the risk of hoven.

Kurrajoing (*Brachychiton populneum*).—This is without doubt the most popular tree with landowners in the western division, being extremely useful as a fodder tree and providing in addition good shade and shelter. Owing to its deep rooting habit crops may be grown practically to the base of the trunk. Propagation from seed is not difficult.

Belah (*Casuarina lepidophloia*).—A useful fodder tree, although the woody and somewhat astringent branchlets have sometimes a bad effect, particularly if fed without a mixture of more succulent species. A useful shade, shelter, and ornamental tree.

Supple Jack (*Ventago viminatis*).—A small to medium sized tree with a 30-ft. height, which generally shows a preference for light drift soils or sandy loams. Often a rather poorly-shaped tree with sparse foliage, but becoming much more dense after lopping. It suckers freely, and is regarded as a most useful fodder tree, some pastoralists ranking it with Kurrajoing.

Whitewood (*Atalaya hemiglauc*).—A small to medium sized tree with a scaly and friable bark. This tree, especially if pruned, is of ornamental appearance, and provides a certain amount of shelter. It is frequently used as a drought fodder, but recently investigations have shown that it is poisonous to horses, although apparently not affecting other stock.

Wild Orange (*Capparis Mitchellii*).—A small tree or large shrub, often of bushy and spreading habit, and found chiefly on clayey loams. The larger trees provide very useful shade and shelter, forming an attractive, rather dense growth, and they are ornamental in appearance.

Quandong (*Fusanus acuminatus*).—A shrub or small tree. The fruit is edible, and is often much sought after. Useful as an ornamental or small shade tree, and with some value as a fodder.

Gruie or Colane (*Owenta acidula*).—A small tree with a milky juice, frequently found on sandy ridges. The tree is very ornamental, provides good shade, and is useful as a fodder.

Wild Lemon (*Canthium oleifolium*).—A shrub or small tree, confined mainly to red soils and sandy ridges. It provides fair fodder during droughty periods. Sometimes known as Myrtle tree.

General Notes.

The Quality of Queensland Bananas.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) informed the Press recently that reference had recently been made to the quality and quantity of bananas produced in this State, and that mention had also been made of the economics thereof. In connection with these matters the Minister stated that a great deal of attention and assistance had been given to this industry by Departmental officers. A very material increase has taken place in both the area of land under banana cultivation and in the quantity of fruit produced since the import duty had been imposed, and it is for growers to recognise that the continuance of the duty demands that their product must be satisfactory both in size and quality. An attempt was made to prevent undersized bananas being exported, and, under regulation, grade standards were prescribed, but a difficulty had been met in the enforcement of the standards of bananas intended for the interstate trade as the application of grade standards conflicts with section 92 of the Constitution of the Commonwealth. With a view of protecting the bananas from frost, many growers have selected land on the top or slopes of hills where the soil is not all that could be desired for banana production. In many cases this soil has rapidly become impoverished, and has failed to grow bananas of satisfactory size and quality. There has also been a rigid adherence to the Cavendish variety of banana, and while this variety had much to commend it, it does not produce such a large fruit or carry so well as the Gros Michel, which is worthy of greater attention by growers.

An examination of ripening arrangements indicated that the methods followed in the maturing of fruit are not in accordance with the best modern practices, and the result is that the fruit is not presented attractively for sale. To these phases of the industry increased attention must be given in the immediate future.

He had no doubt that much of the propaganda against the Queensland banana industry was inspired by vested interests in the South, and by merchants who desire to introduce a policy of free trade in the particular lines of commerce in which they are engaged.

Agricultural Project Clubs.

It is as well that we should remember that the success of a club is determined not by the number of members, but rather by the *work* done by the members. Interest in the work, knowing why a thing is done, the introduction of labour-saving devices, record keeping, costing, &c., are the things that count. For instance, there is little use in having charcoal in a sty if the member does not know why it is there. The child member of a club should be able to answer questions concerning his work, and if he is in charge of a pig then, as a pig club member, he should know its starting age and weight, its breed, its approximate weight and value at the time of the home visit, the increase it is making per day, the points of a good bacon-pig, and wherein his animal falls short of the standard; he should be able to estimate the dressed weight from a given live weight, and know the price of a baconer over the scales.

In regard to the marketing of his animal he should know the weights of a prime baconer (95-120 lb.)—i.e., the weights that command top price, who sets this standard, and the reasons for it. It would be as well to point out to the club member that the weights that command top price vary; for instance, in New South Wales the weight is 105-130 lb., in Victoria, 110-135 lb., while in other countries 200 lb. is the standard. He must realise that, if he is to be successful, he must study the requirements of the market.

A meeting of each club might be reserved for a discussion on "Time saving and making farm work easier." The child only needs a start in that direction. If he commences to think on such lines regarding his club work, he will apply the idea to his school work, and later to his work in life.

A school period might be set apart for club work, and the work done entered in the Work Book. In the Work Book under the heading of Club Work might appear entries such as "Explanation of marking system," "Building of sty and run," "Rations for feeding," "Value of record keeping." During this period the child should be encouraged to take the lead in all discussions. The Club Meeting could be held once or twice a month during school hours, the members electing their own chairman and secretary. The subject for discussion should be fixed some time ahead, so that children will have ample time to collect information.

The teacher should occasionally take a leading part in the meeting, giving a short address on record keeping, costing, and the value of saving time on a particular work by quicker methods or by the use of labour-saving devices. He could then invite the members to think the matter over in connection with their club work and try to put the ideas into practice. Members could be given the opportunity at a later period of addressing other club members, telling them of the labour or time saving device they have employed.

Non-Club Members of upper classes could be permitted to take part in these meetings. They may be interested in the work; often the fact that they are not active members is due to circumstances over which they have no control.

Club Work may be correlated with the Mental Arithmetic, Composition, and Geography lessons.—“Education Office Gazette.”

Canegrowers' Defence Fund Levy.

Following is the result of recent referendum on this question:—

| | | | | | |
|------------------|----|----|----|----|--------------|
| Against the levy | .. | .. | .. | .. | 1,522 votes. |
| For the levy | .. | .. | .. | .. | 1,424 votes. |

Majority against the levy 98 votes.

The levy was to be credited to the Queensland Cane Growers' Council Defence Fund. The proposal now lapses.

A Beautiful Prayer.

“Thou, O Lord, providest enough for all men with Thy most bountiful hand. But whereas Thy gifts are made common to all men, we through our selfishness do make them private and peculiar. Set right again that which our iniquity hath put out of order. Let Thy goodness supply that which our meanness hath plucked away. Give meat to the hungry and drink to the thirsty; comfort the sorrowful, cheer the dismayed and strengthen the weak; deliver the oppressed and give hope and courage to them that are out of heart. Have mercy, O Lord, upon all forestallers, and upon all them that seek undue profits or unlawful gains. Turn Thou the hearts of them that live by cunning rather than by labour. Teach us that we stand daily and wholly in need of one another. And give us grace by hand and mind to add our proper share to the common stock.”—From “Queen Elizabeth's Prayer Book.”

Cotton Board.

An Order in Council has been approved providing for six representatives of growers on the Cotton Board instead of five representatives as previously. The State has accordingly been divided into six districts, from each of which one representative will be elected. The six districts are—

District No. 1.—Comprised of areas served by the railway stations north of Bundaberg to Rockhampton, the Boyne Valley Branch excepting Barrimoon and Kalpowar, beyond Rockhampton to Emu Park and Yepoon, beyond Rockhampton to Westwood on the Central Line, and all lines and branches north of Rockhampton.

District No. 2.—Comprised of the areas served by the railway stations from Boongarry to Mount Morgan and Muruguran and the Central Line and branches west from Westwood.

District No. 3.—Comprised of areas served by the railway stations from Rannes to Theodore and from Rannes to Thangool, inclusive.

District No. 4.—Comprised of areas served by the railway stations on the North Coast Line from Mungar Junction to Bundaberg and branches thereof (including the Gayndah Branch), and Barrimoon and Kalpowar on the Boyne Valley Branch.

District No. 5.—Comprised of the areas served by the railway stations on the North Coast Line from Brisbane to Antigua and branches (including the Nanango-Tarong-Proston and Windera Branches), Brisbane to Grandchester, and all branches between those stations including the South Coast Line and branches and Cleveland Line.

District No. 6.—Comprised of the areas served by the railway stations from Laidley to Toowoomba and Branches on the Southern and Western Line and all branches beyond Toowoomba, Western Line and Branches beyond Toowoomba, Southern Line and branches beyond Toowoomba, and South-Western Line and branches beyond Toowoomba.

Nominations will be received until 17th January, 1929, as Growers' Representatives on the Board until 31st December, 1931, and each nomination must be signed by at least ten growers in the district concerned.

Talagai Holding—A Correction.

By an Order in Council dated 16th August, 1928, "Talgi Holding," near Capella, was declared to be a sanctuary for animals and birds. This should have read Talagai Holding, and an amending Order in Council has now been approved.

Carriage of Bananas to Railway.

Regulations have been approved under "*The Fruit Marketing Organisation Acts, 1923 to 1928*," providing that bananas for carriage to railway station, siding, or other place of railway despatch, shall be carried either in—

- (a) A vehicle specially constructed and used for such purposes only and so fitted and kept as to protect any such bananas from rain and sun or contamination by dust or other means; or
- (b) A vehicle provided with a dust-proof and weather-proof covering such as a tarpaulin or similar contrivance, which covering shall only be temporarily opened or removed for the addition of further loads of bananas en route or on arrival at the railway.

A penalty of £20 is provided for a breach of this Regulation (No. 165).

School for Project Club Members.

A school of not more than twenty boys who have done successful work as members of State Schools' Agricultural Project Clubs will be held at the Queensland Agricultural High School and College from the 28th January to the 9th February, 1929.

Applicants for enrolment in the school may be members of calf, poultry, pig, or other clubs. Railway passes will be granted by this Department to the boys selected to attend the school.

Head teachers are requested to bring to the notice of the Club members in their schools the fact of the projected holding of the school, and to invite applications from members of their clubs. They are then requested to consider the applications and note against each applicant a summary of his claim to selection. They should forward the names of the applicants before the 28th November, and accompany them by a recommendation as to the boy whom they would recommend for admission as their school's representative in the school.

A course of instruction in Agriculture will be afforded the members of the school, the work undertaken including talks and demonstrations in Animal Husbandry, Agriculture, Dairying, and Elementary Science. A feature will be made of such items as the necessity for having the most efficient animals and plants on farms; the benefits arising from Herd Testing; the importance of Weed Control and Moisture Conservation in Queensland farming; illustrations of the methods of decreasing costs of producing crops and stock by proper farm management; the various breeds of stock; methods of feeding; balancing rations for farm stock. Opportunity will be taken also to show as much as possible of the various processes such as butter-making, cheese-making, ice cream-making, and so on.

Staff Changes and Appointments.

Messrs. M. J. Cross and A. C. Euston, of Glastonbury, via Gympie, and Mr. N. L. Miles, of Zillmere, have been appointed Honorary Inspectors under the Diseases in Plants Acts.

Messrs. M. P. W. Button, A. J. McCullough, R. F. Hobler, and A. Cowan have been elected Members of the Windorah Dingo Board, and Mr. J. A. Kidd, of Windorah, has been appointed Government Representative on that Board.

Messrs. J. T. Barnes, J. Drynan, C. J. C. Philp, and R. Woods have been elected Members of the East Moreton Dingo Board, and Mr. J. T. Yore, of Glenmore, Beaudesert, has been appointed Government Representative on that Board.

Mr. J. A. Weddell, Assistant to Entomologists, has been appointed Assistant Entomologist, Department of Agriculture and Stock, as from 6th October, 1928.

The resignation of Mr. N. Devine, of Chudleigh, Daymar, as Honorary Inspector of Stock, has been accepted as from 1st January, 1929, as tendered.

The appointment of Mr. L. A. Downey as Assistant Instructor in Pig Raising has been confirmed as from 5th June, 1928.

Messrs. F. G. Connolly, Assistant Instructor in Fruit Culture, and W. Jost, Inspector of Slaughter-houses, will be retired from the Public Service as from the 30th June, 1929.

Mr. A. McGregor Henderson, Redland Bay, has been appointed a Member of the Arrowroot Board until 14th April, 1931, vice Mr. P. P. Outridge, resigned.

MEASURING THE FLOW.

An inquiry from Beech Forest (Vic.) with reference to the measurement of the flow of streams so as to ascertain the amount of power available shows that hill country residents are waking up to the stored-up energy lying at their feet. A minimum of five-horse power may be taken as sufficient to justify an instalment for converting this power into work. This can be obtained from about 250 cubic feet of water per minute falling from a height of 10 feet, or 50 cubic feet of water per minute falling from a height of 50 feet. The power of small streams may be measured in a simple and sufficiently accurate way by anyone who can use carpentering tools. A temporary dam of sandbags, logs, or stone and earth should be placed across the stream at right angles to the flow, leaving room in the centre for the measuring notch or weir (Fig. 1). The width and depth of the opening in the weir is determined by the size of the stream, and can be ascertained by experiments with a rough model. It should be large enough to allow all the water to flow through the notch, and small enough to cause a still water pond to form for several feet behind the weir. For obvious reasons the measuring should be done in summer time, when the amount of flow is at its lowest. The stream running down from a higher level empties into the pond, which in turn should be emptying itself through the opening in the board at the same rate as the stream is keeping the pond full. This weir

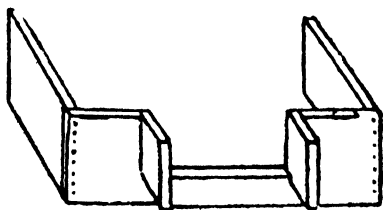


Fig. 1.

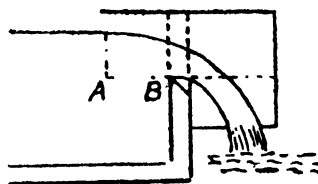


Fig. 2.

should be set at right angles to the flow, upright, and perfectly level. It must be built into the embankment, and into the bottom of the stream, so that no water can escape except through the opening. Fig. 2 shows a cross-section from which it can be seen that the lower edge of the notch is cut on a bevel with the sharp edge upstream. The wings on either side of the notch prevent the stream from contracting as it flows through the opening, which would upset the calculations. The depth should be measured at the point A (Fig. 2) back from the opening, where the water is at a dead level, and moving slowly. Every square inch of water flowing through the opening indicates approximately 1 cubic foot of water per minute. Thus, if the opening is 12 inches wide, and the water flowing through is 6 inches deep at A, $12 \times 6 = 72$ square inches of water, indicating 72 cubic feet per minute. With a fall of 37 feet through a pipe to a turbine this would develop about five-horse power— $72 \times 62\frac{1}{2}$ (weight of 1 cubic foot of water) $\times 37 = 166,500$ lb. of continuous pressure, practically equal to the work of five horses. Theoretically, a horse performs 33,000 feet lb. of work per minute. This method would be sufficiently accurate for an engineer to determine whether it would be worth while installing a turbine on a small stream—"Australasian."

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.

WEANING THE BABY.

When a mother thinks of weaning her baby there are four points which she should take into consideration—

- (1) The age of the child.
- (2) The time of the year.
- (3) The time required for weaning.
- (4) The method of doing it.

The Age at which the Child should be Weaned.

The best time to wean baby is between the age of nine and twelve months. Up to that time his sole food should have been his mother's milk and, unless for urgent reasons, baby should never be weaned before that. The younger the baby is the greater are the risks that attend the process. Thus, a baby four or five months' old is much more likely to become upset or ill if weaned than one eight or nine months. If baby is less than nine months old when weaned, he should be given a feeding bottle, but if over that age it is better to teach him to drink out of a cup, or to use a spoon. If baby has been lottle-fed, when weaning time comes give him his food out of a cup instead of the bottle at first for one feed only during the day, so accustoming him to the change. Then later give the cup for two feeds, and the bottle for the remainder of the day, and so on.

Some mothers think that if they give a bottle feed instead of a breast feed in baby's early months, they will, in this way, make weaning easier. This should not be done. What they almost always achieve is the unnecessary early weaning of the child, for by substituting a bottle feed for a breast feed the mother's milk will diminish. Drinks of boiled water may be given to a young baby from a bottle, but a full feed should not be given while baby is on the breast.

When to Wean the Infant.

The second point is the time of year. Always, if possible, avoid weaning in very hot weather. This is sometimes difficult because Queensland has a long summer. If baby must be weaned during hot weather avoid the worst months. Here the worst months are probably not the hottest, but those during which dysentery or summer diarrhoea (gastro-enteritis, as it is often called) is prevalent. Every summer this disease appears and makes many babies ill. It appears early in summer, and is at its worst in November and December. For this reason, these are the most dangerous months for weaning baby. If he reaches nine months during this time, postpone weaning at least until January and then go very slowly and carefully.

Babies kept wholly on the breast until about fifteen or sixteen months old—i.e., until the cooler weather comes—are often very difficult to wean. Not infrequently they refuse absolutely to take other foods. The older the baby the more difficult he is to wean.

The Time Required for Weaning the Baby.

The third point is the time required for weaning. Unless absolutely unavoidable, the change from natural to artificial feeding should never be sudden. The mother who quite suddenly substitutes the one for the other doubtless does it with good intention, but it is an unkindness to the baby. The change from complete natural feeding to complete artificial feeding should never be made in less than two weeks; preferably take five or six weeks.

Method of Weaning.

The following is a practical plan for weaning after nine months. We will assume that the baby has been fed four-hourly, i.e., at 6 and 10 a.m. and 2, 6, and 10 p.m., so getting five feeds daily.

First Change.—Give baby oat or barley jelly by spoon at the 10 o'clock feed. Begin with one tablespoon of the jelly and give two or three teaspoons of cow's milk on it. Follow this by the usual breast feed and give breast feeds as usual for the remainder of the day. Do this daily for a week and make no other change during that time. A crisp crust may be given once or twice daily before feeds throughout the weaning period. Give it to him when he is hungry. About ten minutes before his feed is due, not between feeds.

Second Change.—Omit breast feeding at 10 a.m. Give instead first the oat or barley jelly, which may be gradually increased to two or three tablespoons, and follow this by about 6 to 8 oz.—about an ordinary cupful—of milk mixture. Make no further change during this second week. Pure milk should not be given to begin with; it is better to commence with about three parts milk to one of water and gradually increase to full strength.

Third Change.—Give the breast every eight hours—i.e., at 6 a.m., 2 p.m., and 10 p.m. Give oat or barley jelly at 10 a.m. and 6 p.m. followed by the milk, as in change 2. Do this daily and make no further change this third week.

Fourth Change and for the 4th week.—Give the breast at 6 in the morning, and 6 at night. At the other three feeds, give the milk mixture. Give oat or barley jelly at 10 a.m. before bottle, and at 6 p.m. before breast.

Fifth Change and for the 5th week.—Give the breast once only; at the 6 a.m. feed. Give milk mixture for all other feeds. Oat or barley jelly before 10 a.m. and 6 p.m. feeds.

Sixth Change and for the 6th week.—Discontinue giving breast at 6 a.m. Give milk only.

Baby is now entirely weaned, and it is probable that it has been achieved without his realising that any change was being made.

After weaning is completed, care is still required to establish the baby on suitable food. He should certainly not be allowed to share the family meals, and eat scraps of everything.

Remember that at this stage food tastes and habits are formed which may last a lifetime.

Important Points to Remember.

The following important points should be remembered by the mother:—

1. Teach baby to drink out of a cup at any time between nine and twelve months (if this has not already been done, and provided he has cut two teeth), and discontinue bottle feeding. Give the drinks from a cup, first at one feed (say, the 10 a.m.), then at two feeds in the day, and so on, thus discontinuing bottle feeding gradually.

2. Keep absolutely to regular meal times. Give nothing whatever but water and fruit juice between meals.

3. As baby takes more solid and varied food he needs less milk, but do not let him go without a drink at each meal. A healthy baby at this age can usually take pure cow's milk. Up to eighteen months milk in some form should be his principal food.

4. Introduce all new foods one at a time and a little at a time. Never make sudden changes. It is better to go too slowly than too quickly.

5. Teach baby to eat each new food that is good for him. Do not let him start the bad habit of refusing food because he does not like it. If persevered with, babies like almost anything that is good for them. They will not want the things which are bad for them if they have never tasted them. Do not let them get the taste for cakes and sweets.

6. Active exercise for teeth, jaws, and salivary glands is absolutely necessary. Baby must be taught to chew, not to bolt his food, and, as time goes on, to take more and more of his food in hard form. Remember that toast or crusts, with butter or dripping and a drink of milk, are just as nourishing and better for teeth and digestion than a basin of bread and milk.

7. Do not add too much sugar to baby's food. It is bad for the teeth and the digestion.

8. Cook all foods thoroughly and serve appetisingly. Add a little salt in cooking.

9. Children should not be continually urged to eat if they are disinclined to do so. Under no ordinary circumstances should a child be forced to eat.

10. If there is any important article of a simple diet, such as milk, meat, cereals, or vegetables, which a child habitually refuses, this should always be given first at the meal, and all other food withheld until this is eaten.

11. Always give the most substantial meal in the middle of the day. Never give a young child a meal of meat and vegetables before he goes to bed at night.

Baby Foods.

The following foods may be given to baby, between the end of weaning and twelve months:—

More cereal jelly, slowly increasing up to 10 oz. daily. More crisp crust and toast; more fruit juice.

From twelve to fifteen months a considerable increase may be made in the diet, always remembering to give new foods one at a time and a little at a time.

Give more solid, dry, and hard foods, such as crusts, baked bread and toast, all to be taken with a little butter or dripping. Sweet biscuits should not be given. They are made from finely ground flour, which form a paste which lodges in the crevices of the teeth, where it is liable to set up fermentation and decay. Cereal jellies to be continued; towards the end of the time gradually mix some unstrained porridge into the jelly and, as time goes on, less and less need be strained. Give milk puddings, made with well-cooked ground rice or semolina. At this time a little egg may be given; perhaps half a yolk two or three times a week. Gradually introduce a little white. Give vegetable milk-broth, chicken broth, or mutton broth. All to be made with pearl barley or rice and to be well strained.

Vegetables.—Floury potato cooked in skin, spinach, cauliflower, carrot, &c., well cooked, rubbed through a fine sieve, and served warm with a little butter or meat gravy without fat.

Fruits.—Pulp of baked apple, or pulp of stewed prunes. Begin with only a teaspoonful and increase very gradually to one or two tablespoons. A little milk may be given with this. Gradually and cautiously some raw ripe apple may be given.

From 15 to 18 months.—Feed on same lines as for previous three months, but give more solid hard foods, including wholemeal bread, and milk puddings made with rice, sago, &c. Give a piece of raw ripe apple at the end of each meal. Continue training baby to chew thoroughly, and avoid giving much soft, mushy food. An egg, lightly boiled, may be given, but not more than three times a week. Light fish, steamed or boiled, may be given; also chicken, steamed or boiled and either well minced, or preferably chewed off the bone. Only a teaspoonful of either fish or chicken should be allowed at first, and the quantity very slowly increased.

An important point for the mother to remember during this period is that, though baby's first teeth are only now being cut, the second set of permanent teeth are forming in the gums. Their strength and durability depend very largely on the foods given, and the amount of work done by mouth and jaws at this time.

PRICKLY-PEAR—PREVENTION OF FURTHER SPREAD.

The Prickly-pear Land Commission, which took up duty in April, 1924, issued a statement setting out the policy which it was intended to pursue. Portion of that statement read as follows:—

“To clear Queensland of prickly-pear is at present quite impossible. The cost of the first clearing alone, even if practicable, would probably exceed £100,000,000. It is not to attempt the impossible, but to stop the further spread of pear, to do justice to the holders of pear lands, to encourage and reward their efforts in clearing, to make uniform and consistent and generally improve the administration of pear-infested lands, that the Commission has been appointed.”

Four years have elapsed since the aim of the Commission was so stated, and the Commission in its annual report states that, except in the northern portion of the Commissioners' territory where the country is used solely for grazing cattle, the returns from which have not warranted heavy expenditure in pear-clearing, the further spread of pear has been definitely stopped.

There is considerably less pear in Queensland to-day than when the Commission took office, and the further spread of this pest has been effectively controlled.

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MRS. L. J. REUTER—White.
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MRS. R. WILKS—Golden Yellow.
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Orchard Notes for February.

THE COASTAL DISTRICTS.

February in coastal Queensland is frequently a wet month, and, as the air is often heavy with moisture and very oppressive, plant growth of all kinds is rampant, and orchards and plantations are apt to get somewhat out of hand, as it is not always possible to keep weed growth in check by means of cultivation. At the same time, the excessive growth provides a large quantity of organic matter which, when it rots, tends to keep up the supply of humus in the soil, so that, although the property looks unkempt, the fruit-producing trees and plants are not suffering, and the land is eventually benefited. When the weed growth is excessive and there is a danger of the weeds seeding, it is a good plan to cut down the growth with a fern hook or brush scythe and allow it to remain on the ground and rot as it will thereby prevent the soil from washing, and when the land is worked by horse power or chipped by hand it will be turned into the soil. This is about the most satisfactory way of dealing with excessive weed growth, especially in banana plantations, many of which are worked entirely by hand.

The main crop of smooth leaf pineapples will be ready for canning, and great care must be taken to see that the fruit is sent from the plantation to the cannery with the least possible delay and in the best possible condition. The only way in which the canners can build up a reputation for Queensland canned pineapples is for them to turn out nothing but a high-class article. To do this they must have good fruit, fresh, and in the best of condition.

The fruit should be about half-coloured, the flesh yellowish, not white, of good flavour, and the juice high in sugar content. Over-ripe fruit and under-ripe fruit are unfit for canning, as the former has lost its flavour and has become "winey," while the latter is deficient in colour, flavour, and sugar content.

For the 30 or 32 oz. can, fruit of not less than 5 in. in diameter is required, in order that the slices will fit the can; but smaller fruit, that must not be less than 4 in. or, better still, 4½ in. in diameter, and cylindrical, not tapering, can be used for the 20-22 oz. can.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well filled and not partly developed. If the fruit is over-ripe it will not carry well, and is apt to reach its destination in an unsaleable condition.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees that have recently been thinned out, and these must be removed. Where there are facilities for cyanidings, this is a good time to carry out the work, as fruit treated now will keep clean and free from scales till it is ready to market. Citrus trees can be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees, as they transplant well at this period of the year.

A few late grapes and mangoes will ripen during the month and, in respect to the latter, it is very important to see that no fly-infested fruit is allowed to lie on the ground but that it is gathered regularly and destroyed. Unless this is done, there is every probability of the early citrus fruits being attacked by flies bred out from the infested mangoes.

Strawberries may be planted towards the end of the month, and, if early ripening fruit is desired, care must be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be brought into a state of thorough tilth by being well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertiliser, as strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of peaches and plums, and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice given in these notes for the two previous months, with regard to handling, grading, packing, and marketing is again emphasised, as it is very bad policy to go to all the trouble of growing fruit and then, when it is ready to market, not to put it up in a way that will attract buyers.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market. Expenses connected with the marketing of fruit are now so high, owing to the increased cost of cases, freight, and selling charges, that it is folly to attempt to market rubbish.

During the early part of the month it will be necessary to keep a careful watch on the crop of late apples in order to see that they are not attacked by codlin moths. If there is the slightest indication of danger, a further spraying with arsenate of lead will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit fly must also be systematically fought wherever and whenever found, and no infested fruit must be allowed to lie about on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least before packing. This tends to tighten the hold of the individual berries on the stem and thus prevent their falling off.

In the western districts winemaking will be in progress. Here again care is necessary, as the better the condition in which the fruit can be brought to the press the better the prospect of producing a high-class wine.

Where necessary and possible citrus trees should be given a good irrigation, as this will carry on the fruit till maturity, provided it is followed up by systematic cultivation so as to retain a sufficient supply of moisture in the soil.

Farm Notes for February.

Reference was made in last month's Notes to the necessity for early preparation of the soil for winter cereals, and to the adoption of a system of thorough cultivation in order to retain moisture in the subsoil for the use of crops intended to be raised during the season. The importance of the subject, and its bearing in relation to prospective crop yields, is made the excuse for this reiteration.

Special attention should be given to increasing the area under lucerne (broadleaf Hunter River), wherever this valuable crop will grow. Its permanent nature warrants the preparation of a thorough tilth and seed bed, and the cleansing of the land, prior to sowing the seed, of all foreign growths likely to interfere with the establishment and progress of the crop. Late in March or early in April is a seasonable period to make the first sowing providing all things are favourable to a good germination of seed.

Dairymen would be well advised to practise the raising of a continuity of fodder crops to meet the natural periods of grass shortage, and to keep up supplies of succulent fodder to maintain their milch cows in a state of production.

Many summer and autumn growing crops can still be planted for fodder and ensilage purposes. February also marks an important period as far as winter fodder crops are concerned, as the first sowings of both skinless and cape barley may be made at the latter end of the month in cool districts. Quick-growing crops of the former description, suitable for coastal districts and localities where early frosts are not expected, are Soudan grass, Japanese and French millet, white panicum, liberty millet, and similar kinds belonging to the *Setaria* family. Catch crops of Japanese and liberty millet may also be sown early in the month in cooler parts of the State, but the risk of early frosts has to be taken.

Maize and sorghums can still be planted as fodder and ensilage crops in coastal districts. In both coastal and inland areas, where dependence is placed largely on a bulky crop for cutting and feeding to milch cows in May and June, attention should be given to 'Planters' Friend (so-called Imphee) and to Orange cane. These crops require well-worked and manured land; the practice of broadcasting seed for sowing at this particular season encourages not only a fine stalk but a density of growth, which in itself is sufficient to counteract to some extent the effect of frost.

In most agricultural districts where two distinct planting seasons prevail, the present month is an excellent time for putting in potatoes. This crop responds to good treatment, and best results are obtainable on soils which have been previously well prepared. The selection of good "seed" and its treatment against the possible presence of spores of fungoid diseases is imperative. For this purpose a solution of one pint of formalin (40 per cent. strength) to 24 gallons of water should be made up, and the potatoes immersed for one hour immediately prior to planting the tubers. Bags and containers of all kinds should also be treated, as an additional precaution. "Irish Blight" has wrought havoc at times in some districts, and can only be checked by adopting preventive measures and spraying the crops soon after the plants appear above the ground. Full particulars on the preparation of suitable mixtures for this purpose are obtainable on application to the Department of Agriculture, Brisbane.

Weeds of all kinds, which started into life under the recent favourable growing conditions, should be kept in check amongst growing crops; otherwise yields are likely to be seriously discounted. The younger the weeds the easier they are to destroy. Maize and other "hoed" crops will benefit by systematic cultivation. Where they are advanced, and the root system well developed, the cultivation should be as shallow as possible consistent with the work of weed destruction.

First sowings may now be made of swede and other field turnips. Drilling is preferable to broadcasting, so as to admit of horse-hoe cultivation between the drills, and the thinning out of the plants to suitable distances to allow for unrestricted development. Turnips respond to the application of superphosphate; 2 cwt. per acre is a fair average quantity to use when applied direct to the drills.

Where pig raising is practised, land should be well manured and put into good tilth in anticipation of sowing rape, swedes, mangels, field cabbage, and field peas during March, April, and May.

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Farmers particularly are urged to keep their names on our mailing list, for through the Journal they may keep themselves well informed in respect to the activities of the Department, and other matters with which they are directly concerned. Instead of sending just the annual subscription along it is suggested that, when renewing it, they do so for a longer term. For instance, five shillings would keep their names on our subscribers' register for five years. By doing this they would obviously help to reduce clerical labour as well as avoid the inconvenience to themselves of posting annually the very small sum necessary to keep their names on our mailing list.

On another page an order form may be found, and for those whose annual subscription is about due what is wrong with filling it up now and posting it direct to the Under Secretary, Department of Agriculture and Stock?

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

**TIMES OF SUNRISE, SUNSET, AND
MOONRISE.****AT WARWICK.****MOONRISE.**

| Date. | January, 1929. | | February, 1929. | | Jan., 1929. | Feb., 1929. |
|-------|-------------------|-------|--------------------|-------|----------------|----------------|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| 1 | 5.1 | 6.49 | 5.26 | 6.46 | p.m. 11.14 | p.m. 11.14 |
| 2 | 5.2 | 6.49 | 5.26 | 6.45 | 11.43 | 11.47 |
| 3 | 5.3 | 6.49 | 5.27 | 6.45 | ... | 0.0 |
| 4 | 5.3 | 6.50 | 5.28 | 6.44 | a.m. 12.13 | a.m. 12.23 |
| 5 | 5.4 | 6.50 | 5.28 | 6.44 | 12.43 | 1.5 |
| 6 | 5.5 | 6.50 | 5.29 | 6.43 | 1.15 | 1.53 |
| 7 | 5.6 | 6.51 | 5.30 | 6.42 | 1.48 | 2.43 |
| 8 | 5.6 | 6.51 | 5.31 | 6.42 | 2.26 | 3.37 |
| 9 | 5.7 | 6.51 | 5.31 | 6.41 | 3.10 | 4.32 |
| 10 | 5.8 | 6.51 | 5.32 | 6.40 | 3.58 | 5.31 |
| 11 | 5.9 | 6.51 | 5.33 | 6.40 | 4.51 | 6.32 |
| 12 | 5.9 | 6.51 | 5.34 | 6.39 | 5.44 | 7.31 |
| 13 | 5.10 | 6.51 | 5.34 | 6.38 | 6.41 | 8.29 |
| 14 | 5.11 | 6.51 | 5.35 | 6.37 | 7.40 | 9.27 |
| 15 | 5.12 | 6.51 | 5.36 | 6.37 | 8.37 | 10.27 |
| 16 | 5.13 | 6.51 | 5.36 | 6.36 | 9.36 | 11.30 |
| 17 | 5.13 | 6.51 | 5.37 | 6.35 | 10.34 | 12.37 |
| 18 | 5.14 | 6.51 | 5.38 | 6.34 | 11.33 | 1.44 |
| 19 | 5.15 | 6.51 | 5.38 | 6.34 | 12.34 | 2.49 |
| 20 | 5.16 | 6.50 | 5.39 | 6.33 | 1.38 | 3.52 |
| 21 | 5.16 | 6.50 | 5.40 | 6.32 | 2.46 | 4.51 |
| 22 | 5.17 | 6.50 | 5.40 | 6.31 | 3.53 | 5.43 |
| 23 | 5.18 | 6.49 | 5.41 | 6.30 | 5.3 | 6.26 |
| 24 | 5.19 | 6.49 | 5.42 | 6.29 | 6.7 | 7.2 |
| 25 | 5.19 | 6.49 | 5.42 | 6.28 | 7.4 | 7.37 |
| 26 | 5.20 | 6.48 | 5.43 | 6.27 | 7.53 | 8.9 |
| 27 | 5.21 | 6.48 | 5.44 | 6.26 | 8.32 | 8.40 |
| 28 | 5.22 | 6.48 | 5.44 | 6.25 | 9.10 | 9.11 |
| 29 | 5.23 | 6.47 | | | 9.41 | |
| 30 | 5.24 | 6.47 | | | 10.13 | |
| 31 | 5.25 | 6.47 | | | 10.43 | |

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | |
|--------|-----------------|------------|
| 3 Jan. |) Last Quarter | 4 34 a.m. |
| 11 " | ● New Moon | 10 28 a.m. |
| 19 " | (First Quarter | 1 15 a.m. |
| 25 " | ○ Full Moon | 5 9 p.m. |

Apogee, 8th January, at 1.42 a.m.

Perigee, 23rd January, at 9.48 p.m.

The Earth will make its nearest approach to the Sun on the 1st, when its distance will be about 91,300,000 miles.

The occultation of three small stars in Aquarius, known as Psi 1, Psi 2, Psi 3, will form an interesting spectacle for amateurs between 8 and 10 on the evening of the 15th. These naked-eye stars are of magnitude 4.5, 4.6, and 5.2. They will disappear on the dark edge of the crescent-shaped Moon under conditions very favourable when using a small telescope or binoculars. As the time of disappearance will vary at different places it will be desirable to commence observations before 8 o'clock. Psi 1 is a beautiful coloured double star, one of the components orange-coloured, the other sky-blue.

When the Moon is passing Omikron Piscium, late in the evening of the 18th, an interesting observation could be made by the owners of telescopes in the latitude of Warwick and Toowoomba in noting whether the star will disappear or merely skirt the edge of the Moon.

The Moon will be passing Mars on the 22nd at 6 p.m., and it will be interesting for those with keen eye-sight to endeavour to see Mars in daylight. It will be 4 degrees to the north of the Moon, or nearly eight times the diameter of the Moon away from it. The Moon and planet will be in the north-east, on the opposite side of the sky to the setting Sun.

The Moon will pass 5 degrees to the north of Neptune on the 26th about 9 a.m. when Neptune will be quite invisible without a powerful telescope.

Mercury will rise thirty-nine minutes before the Sun on the 1st and sixty-five minutes before it on the 15th. Venus will set at 9.14 p.m. on the 1st and at 9.25 p.m. on the 15th. Mars will rise at 5.45 p.m. and set at 3.42 a.m. on the 1st. On the 15th it will rise at 4.35 p.m. and set at 2.42 a.m.

Jupiter will rise at 1.25 p.m. and set at 1.43 a.m. on the 1st. On the 15th it will rise at 12.34 p.m. and set at 11.51 p.m.

Saturn will rise at 3.50 a.m. and set at 5.34 p.m. on the 1st. On the 15th it will rise at 3.3 a.m. and set at 4.46 p.m.

The Moon will be in Leo on the 1st; in Virgo from the 2nd to the 4th; in Libra on the 5th and 6th; in Scorpio on the 7th; in Orphicous on the 8th; in Sagittarius from the 9th to the 11th (new Moon); in Capricornus on 18th; in Aquarius from 14th to 16th; in Cetus on 16th and 17th; in Pisces on 17th and 18th; in Aries on 18th and 20th; in Taurus from 20th to 22nd; in Gemini on 23rd and 24th; in Cancer on 24th and 25th; in Leo 26th and 27th; and in Virgo from the 28th to the 31st.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

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1 FEBRUARY, 1929.

PART 2.

Event and Comment.

Marketing of Bananas.

FOLLOWING upon his recent visit to Sydney and Melbourne, in the course of which, in conjunction with the Under Secretary (Mr. E. Graham), he had taken the opportunity of personally investigating the supply of bananas to the Southern markets, both in respect to the quality of the fruit and the conditions under which sales are effected, the Minister for Agriculture (Mr. W. Forgan Smith, M.L.A.) has issued a full statement as to the exact position in connection with these matters.

Mr. Forgan Smith said that it was found that a high percentage of bananas of satisfactory quality was now being supplied to the Southern markets. However, personal investigation had disclosed defects in the grading of the fruit, and there was ample evidence to show that individual growers frequently mark their cases in a manner wrongly describing the contents. In fact, in some cases brought under his notice the description was no indication of the contents at all. This irregularity in grading has been responsible for a good deal of the adverse comment to which the Queensland banana industry has been subjected. The inclusion of bananas of various grades in the same case has also had a detrimental influence. Instances of growers supplying three grades of bananas in one case were not uncommon, and examples also occurred of growers marking their fruit as being of "extra special quality" when inspectors at the growers' railing station had found it necessary to insist on altering this classification to that of "plain." Happenings like this, he added, indicated the necessity for the imposition of grade standards, and for a closer observance of the correct classification of the fruit, and justified the Department in the action it had taken to attain this very desirable objective. Uniformity in the method of packing the fruit by the growers would be of advantage. The presence of "squirter" in bananas was not detected, but the fruit, in a number of cases, had developed what is known as "wet end." This defect is of considerable concern to those engaged in

the ripening of bananas, because in practice it is found that the darkening and decay of the fruit expand considerably whilst in the ripening chambers. A large number of merchants are engaged in the ripening of bananas, but only in a few instances did the ripening chambers appear to meet the requirements, and it cannot be said that the ripening of fruit is carried out generally on scientific or systematic lines. In this connection Dr. Young, of the Council of Scientific and Industrial Research, is busily engaged in carrying out investigations relative to banana transport and the ripening of the fruit; and in furtherance of this object special chambers have been erected at one of the University buildings in Melbourne, and activities designed for similar purposes are being carried out by Dr. Baxter at the Queensland University.

Banana Grade Standards.

CONTINUING, the Minister said that the grade standards as prescribed recently by the Queensland Department were fully discussed with the responsible officers in the Southern Departments of Agriculture, and New South Wales has at present under consideration the matter of prescribing standards for bananas, and it is probable that that State, as well as Victoria, will institute grade standards in conformity with those in operation in Queensland. In addition to inspecting a considerable quantity of bananas produced in Queensland, opportunity offered to see bananas that were grown in either New South Wales, Fiji, or Norfolk Island, and from the latter source some good specimens of the Gros Michel variety were observed, but, generally speaking, the quality of the bananas supplied from Queensland was equal to that obtained from other parts. Unfortunately, it is the practice of some fruitsellers to acquire good quality fruit from Queensland and dispose of it as Fijian.

The Minister expressed as his considered opinion the view that the outstanding influences militating against the industry in the Southern markets were irregularities in the grading of the fruit and the marketing of under-sized bananas. Both these defects could be overcome by the strict observance of the standard requirements and the concerted action of the growers. The satisfactory quality of Fijian bananas was frequently mentioned by persons engaged in the fruit business, but in very few instances was the desire expressed to introduce bananas from Fiji, provided that the Queensland growers were prepared to supply the market with fruit of satisfactory quality and packed in cases upon which the grade of the fruit was correctly marked. There is no reason why the banana-growers of Queensland and New South Wales should not be able to hold the trade in bananas within Australia, but those markets must at all times be supplied with fruit of satisfactory quality and adequate in quantity to meet the market requirements.

The Queensland Sugar Industry.

THE criticism that has been levelled at portion of the last Annual Report of the Director of Sugar Experiment Stations appears to be very largely the result of slovenly reading, while an unfair article published recently in a Southern journal makes what looks like deliberate suppressions. In Dr. Kerr's report on some phases of the industry in Java, incorporated in the Director's report, to which exception has been taken, it was only intended to point out what had been achieved in Java by the adoption of scientific control methods, and it was not even inferred that such marked improvements could be effected in Queensland. Dr. Kerr says, "Although conditions in these islands are quite different to those obtaining in Queensland, still it is interesting to study the marked advances which have been effected during the last forty years by the application of the scientific method of control to the agriculture of cane growing"; while in speaking of intensive cultivation as practised in Java the report specifically states "it must, of course, be remembered that the costs of labour in Java are remarkably low," and "naturally many of the reforms which have been introduced could find but limited application in Queensland." Also, "by the system of land tenure operating in Java no ratoons are grown," and "the island is blessed with climatic conditions which are admirably suited for cane culture and that irrigation is practised almost generally."

It will thus be seen that the statements which have been objected to are qualified very materially, and the report should be read as a whole. It has also been stated that the returned travelling scholars should not have made reports until they had

gained some practical experience in the production of sugar in Queensland. As a matter of fact, the scholars did have extensive practical experience in the sugar districts of the State before going abroad, and one of them (Mr. Bennett) had also considerable mill experience in Queensland.

The Researcher and the Producer.

IN his last Annual Report the Public Service Commissioner, Mr. J. D. Story, I.S.O., comments very pithily on current rural topics, and has this to say on the researcher and the producer:—

“The new slogan ‘Research; Research’ seems to be drowning the old slogan ‘Produce; Produce.’ The voice of the scientist rings through the land announcing discoveries which scientific research has made, and some of these discoveries approach the magical; compared with them, even wireless becomes almost a thing of yesterday. Listening to the fascinating accounts of these discoveries, one becomes a little uneasy as to whether science is not racing ahead of the producer and far out-distancing him; as to whether the farmer is actually translating into practical action the discoveries and teachings of science. That thought raises the further thought as to whether these discoveries are being communicated promptly to the producer in that simple, concise, and illustrative way which makes them easily grasped and strikingly appealing; whether facilities exist to make it possible for the farmer to follow the teachings; if the facilities do not exist what action is being taken to create them. Unless there be effective linking of the discovery of the scientist with the practical application of the producer, much of the scientist’s work must go for nought and the producer will continue to suffer when he need not. And, remember that statistics tell us that approximately 40 per cent. of our male breadwinners are engaged directly or indirectly in primary production. What, then, would be the best form of link between the scientist and the producer? The technical officers of the Department of Agriculture do what they can, but even they, perforce, often have difficulty in keeping abreast of new developments; opportunities for doing so are not always available; nevertheless, the trained instructor appears to be the corollary to the trained investigator. Confining ourselves particularly to Queensland, the time seems to have come when we should try to sift carefully the discoveries of science which are of highest value to primary production, and determine ways and means by which the lessons can be driven home with force and vigour. Something more is needed than mere sermonettes on a subject such as ‘Farming on Scientific Lines.’ If it be worth while to engage scientists to discover new facts and new processes, it is surely worth while to develop schemes by which proved methods may be put into practice. But these things should not be left entirely to the State. ‘Commodity Boards and kindred bodies have their obligations; they have their part to play and they should play it. In my limited sphere I shall help as much as I can. As a layman I have approached this subject with some diffidence; but even a layman sometimes gets a point of view which escapes the expert.’”

Citriculture.

THE season for planting citrus trees will soon be favourable, and the attention of planters is particularly directed to the selection of varieties. In oranges, Sabina or Siletta and Joppa take precedence for Southern markets. These are only surpassed by navels which, unfortunately in many parts of the State, are not sufficiently productive to warrant their inclusion. A late variety, Valencia, takes precedence. Among mandarins, Glen Retreat is preferable in districts which are favourable, followed by Emperor, Scarlet, and for the Northern late crop, King of Siam. The difficulty of bud selection from trees of proved merit has been in a measure overcome by nurserymen procuring their supplies from approved trees. Though the additional cost is not high, it warrants a slight advance on the cost of trees. Growers would be well advised to insist on nurserymen supplying a guarantee that trees have been worked with the buds approved by the Department. The trees make three distinct growths in a year, and whilst dormant between any of these periods they may be transplanted with safety, but error on either side results in the root fibres perishing, and though the trees may survive they are very slow in making reasonable growth.

Bureau of Sugar Experiment Stations.

CROP PROSPECTS FOR 1929.

The Deputy Premier and Secretary for Agriculture and Stock, Mr. W. Forgan Smith, has received the following report from the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, upon the prospects of the sugar crop for 1929:—

"It is as yet too early to anticipate what the sugar yield this year is likely to be. Splendid rains have fallen in the districts above Townsville and at Mackay, so the crops should be good in those places, provided further wet season rain comes along. The southern areas are, however, needing rain urgently. A period of good soaking rains is required at Bundaberg, Childers, and in the cane districts to the south.

"The area under cane in Queensland is now approaching 300,000 acres, while the area from which cane was crushed in 1928 is given as 225,371 acres, being an increase over 1927 of some 21,623 acres. As there was an increase in the area crushed in 1927 of 14,436 acres over that given for 1926, it can be seen that the acreage under cane has materially increased in the past two years.

"The cane crop last year amounted approximately to 3,750,000 tons, which was easily a record, while the tons of cane required to make 1 ton of sugar are estimated to have been 7.25, which is the lowest to date."

ENTOMOLOGIST'S ADVICE TO CANEGROWERS.

FIRST PUBLICATION OF MONTHLY HINTS.

By EDMUND JARVIS.

This series of Entomological Notes was started five years ago (November, 1923), for the purpose of reminding our canegrowers of their responsibilities with regard to the control of those cane insects likely to be in evidence during each month of the year.

By early publication of full details regarding suitable methods of combating such insects, our object has been to save time, as far as possible, in order that growers may be in a position to tackle any pest upon the first indication of damage to the crop. Prompt action often goes far towards minimising injuries caused by such insects as "army-worms," or the grubs of some of our cane beetles.

Farmers are asked to take notice, however, that the activities of Meringa Experiment Station—in so far as visits of inspection from officers of the entomological staff, or the supplying of consignments of Tachinid fly parasites of the beetle borer be concerned—do not extend to localities below Townsville, or to those above Mossman.

Control of Cane Grubs.

First-stage larvæ of the "greyback" will be feeding until about the middle of this month, after which they will change their skin and enter upon the second instar, during which stage of growth they are able to effect serious damage to cane situated on light volcanic soils.

In order to distinguish between these moults of the larval condition of our "greyback" cockchafer, growers need only examine the head; which, unlike the body, does not alter in size during the periods occupied by each successive instar.

The width of head in first-stage grubs is $\frac{1}{8}$ inch; in the second instar, $\frac{1}{4}$ inch; and in the third instar, $\frac{1}{2}$ inch.

During this month infested cane fields should be fumigated with paradichlorobenzene or with carbon bisulphide, both of which fumigants have been proved to be valuable remedies when applied at the right time and to soil in a fit state for such fumigation. With regard to the latter fumigant—the toxic effects of which endure for only a day—expense of material and application will be entirely thrown away unless the soil has first been found to be in the right condition for allowing the poisonous fumes to penetrate freely in all directions.

With paradichlorobenzene the case is very different, seeing that after injection of the crystalline nodules, evaporation of the deadly gas continues through a period of from four to six weeks or longer. Wet weather simply retards or checks its rate of evaporation, which, however, is again resumed as soon as any excess of moisture has drained away.

Disturbing Grubs in the Soil.

Try to maintain a system of clean cultivation, particularly on land reserved for early planting, and which on that account is likely to receive less attention than areas devoted to the present season's crop. Advantage should be taken of the first opportunity afforded for moving the surface soil between rows of young shoots of plant or ratoon cane on land known to be liable to grub infestation. By disturbing the soil as close as can be effected without injury to the plants, first-stage grubs are often brought to the surface, while others are dislodged from their tunnels, becoming, in consequence, likely to fall an easy prey to ants or other soil-frequenting predaceous foci.

Controlling Grubs of Cane Beetles.

During the beginning of February larvæ of our "greyback" cockchafer occurring in the district of Cairns will be in the first and second stages of growth, and on light volcanic soils will have commenced to cause appreciable damage to cane roots.

In first-stage grubs the head is never more than one-eighth of an inch wide, although the length of the body during this first instar may vary from one-third to half an inch in its doubled-up condition. Those in the second instar can at once be distinguished by the increased width of head, which then measures three-eighths of an inch.

Growers should take advantage of the first opportunity afforded for moving the surface soil between rows of young shoots of ratoon or plant cane thought likely to be grub-infested.

At times when the weather sets in dry for a week or so after a short spell of rainy days such movement of the surface soil becomes highly advantageous, since it not only stimulates growth of the stools and conserves the moisture, but by disturbing the soil as close against the cane rows as can be effected without injury to the plants, some of these small grubs are brought to the surface, while others, being dislodged from their tunnels and mixed with loose particles of earth, are likely to fall an easy prey to soil-frequenting ants or other predaceous enemies.

Fumigating Cane Grubs.

No time should now be lost before fumigating grub-infested land with paradichlor. or carbon bisulphide. In cases where soil injectors or special horse machinery cannot be easily procured, the crystalline nodules of the former fumigant (after being passed through $\frac{1}{2}$ -mesh sieve) can be applied with the manure in any fertilising machine that will drill in this mixture to a depth of about 4 inches, and at a distance of about 5 inches from the cane rows; and after burying it will fill in the drill and slightly consolidate such disturbed soil by rolling same. Be careful to thoroughly mix the fumigant with the manure to ensure an even distribution; and to regulate the flow of the mixture in such manner as to sow about 120 lb. of paradichlor. per acre.

How to Fight Army Caterpillars and Plant-Eating Beetles.

Small beetles belonging to genus *Rhyparida* may prove injurious this month to young shoots or leaves of cane. The creamy-yellow grubs of this pest occur underground amongst the roots or in the centre of the shoots, giving rise to "dead-hearts"; while the beetles eat holes in the leaves of larger plants. Cutting out all dead shoots; collecting the beetles when very numerous; keeping headlands free from blady grass; and fumigating badly-infested soil with carbon bisulphide are all suitable remedial measures.

Outbreaks of army caterpillars, &c., can be combated by spraying the cane leaves in front of an advancing army with lead arsenate applied at the rate of 2 lb. in about 50 gallons of water. The mixture must be kept well stirred while being sprayed, as this poison has a tendency to settle to the bottom of the water unless kept agitated.

CANE PESTS AND DISEASES.

Mr. A. N. Burns, Assistant Entomologist, Central district, has submitted the following report for the month ended 12th December, 1928, to the Director of Bureau of Sugar Experiment Stations:—

Emergence of Greyback Beetles (*Lepidoderma albobirtum* Waterh.)

Following the beneficial rains of 25th and 26th November last, when just on 3 inches were recorded for the two days, the first, and probably general emergence of these beetles commenced. Since that time several more good falls of rain have occurred, keeping the soil in an ideal condition for the continued emergence of cane beetles. The numbers of beetles vary very considerably in different parts of the district. Plane Creek and Sarina report a moderate emergence only (from beetles received by collectors, and those noted on feeding trees) whilst around Racecourse and Farleigh areas large quantities of beetles are being collected. Feeding trees growing adjacent to the canefields along the Pioneer River are already almost denuded of their leaves. The same thing is to be seen in some of the feeding trees growing in the scrub lands adjoining canefields on the northern side of the railway line near Farleigh.

The writer has observed greybacks feeding on many trees that in the far northern areas were apparently free from attack. Native figs of various species (*Ficus* spp.) undoubtedly rank first in importance throughout this district as feeding trees, then Moreton Bay Ash (*Eucalyptus tessellaris*), Bloodwood (*E. corymbosa*), Blue Gum (*E. tereticornis*) and many different species of scrub trees are attacked to a more or less serious degree. As the beetle season advances, greater numbers of beetles may be collected from scrub trees, large numbers seeming to forsake the Eucalypts and other forest land trees.

Usually during the earlier portion of the fighting season male beetles predominate. From examples collected and dissected, however, at the present time the sexes appear to be fairly evenly proportioned. Hand collecting is being carried out in earnest throughout the district; this is to be greatly recommended, and in conjunction with the destruction of feeding trees growing in the immediate vicinities of canefields—particularly on the windward side—will tend to greatly minimise the subsequent grub infestation.

The writer would like to urge the advisability for the collection and payment of grubs as well as beetles. It is equally desirable, if not more so, to collect grubs; grubs collected in the months of February, March, and April will be prevented from doing further damage—they are active up till June and July—and that alone, particularly in the case of land that is being ploughed prior to planting, is invaluable. Besides the prevention of further injury, the subsequent emergence of beetles will be considerably lessened in areas where grubs are collected and destroyed.

Main Emergence of "Frenchi" Beetles (*Lepidiota frenchi* Blkb.)

The recent rains have been responsible for bringing out the main bulk of this species, and every evening about dusk, large numbers may be seen in flight, subsequently settling down in pairs on low bushes, fences, &c. Unlike the greybacks, these beetles do not resort to "feeding trees" during the daytime, therefore if they are collected, advantage must be taken of the comparatively brief time occupied during the evening flight.

There is also another flight in the early morning which occurs about half an hour or twenty minutes before sunrise; the evening flight, however, is more favourable for collecting as the beetles are settling on objects, whereas in the morning flight they leave the bushes and enter the soil, after flying about in apparent confusion for some minutes. They sometimes settle near the ground and remain quiescent for a minute or two before finally burrowing in.

Recently, during evening flights, the writer obtained up to as many as nine specimens trying to cluster together, clusters of six and more were very plentiful, and hundreds of mated pairs were hanging everywhere. The aerial existence of this species lasts approximately six weeks or more, and night after night the beetles leave the soil in flight. The eggs of this beetle are not deposited as is the case with the greyback, in a definitely formed cell; they are laid loosely amongst the soil, usually at a depth of from 3 to 6 in. Each egg is enclosed in a small pellet of earth, due to the earth clinging to the glutinous matter on the egg shell immediately after it is laid. Oviposition habits, &c., are at present being studied at the laboratory.

Christmas Beetles (*Anoplognathus boissduvali* Boltd.) in Flight.

These well-known "Golden Beetles" have been very plentiful since the rains of two weeks ago, and large numbers are being collected along with greybacks from feeding trees. In different localities, this species appears to favour different trees on which to feed. In the Cairns district the most favoured trees appear to be the Blue Gum (*Eucalyptus tereticornis*), Poplar Gum (*E. platyphylla*), Moreton Bay Ash (*E. tessellaris*), and Bloodwood (*E. corymbosa*), whilst on the Tully the writer obtained them in hundreds from young river myrtles (*Eugenia tierniana*). In the Mackay district, however, one of the most, if not the most favoured feeding tree is the common guava which fringes the roads, canelands, &c. Moderately large numbers may also be collected from the Blue Gums (*E. tereticornis*), Moreton Bay Ashes (*E. tessellaris*), and Bloodwoods (*E. corymbosa*). These beetles are voracious and rapid feeders. In many places the feeding bushes (guavas) already bear a "scorched" appearance due to the beetles having eaten all the leaf tissues away, leaving only the hard veins and midribs.

The writer bred examples of this beetle from grubs collected at the Experiment Station, also from several farms in the Mackay district. In each instance the grubs were found in canefields where the soil contained silt and wash from creeks, &c., and the injury caused to the cane was precisely similar to that occasioned by grubs of the "Dasynathus Beetle" (*Dasynathus australis-dejeani* Blkb.), i.e., the grubs had bored into the ends of the cane sets. In the writer's opinion, this and the *Dasynathus* beetle rank almost equally in order of destructiveness in the Mackay district, and could be placed about third in order after the greyback and frenchi beetle grubs.

Mr. A. N. Burns, Assistant Entomologist, stationed at Mackay, has submitted the following report for the month ended 12th January, 1929, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

Wireworm Damage at Walkerston.

Following a request made by a grower at Walkerston, an inspection was carried out on a farm where considerable injury had been done and loss sustained as a result of wireworm damage. In one field of Q. 813 plant cane, fully 2 acres had been eaten out, and the grower had to supply new sets, in some instances as often as three times, in the attacked portion. The "supplied" area of small young cane stood out in marked contrast to the surrounding cane, which was fully 3 ft. or more high.

The field was almost level, but had a slight fall towards one end; the attacked portion occupied the lowest-lying part, and was the only place where water lodged during rains. The soil was fairly heavy, dark brown-black, and contained much silt; it had a tendency to consolidate when wet. Another small block of about half an acre on the same farm was also badly affected, and the grower stated that he always found it almost impossible to secure a strike in that particular block owing to the ravages of wireworms. The ground here was black and of a very heavy nature, and the situation was low-lying with poor drainage. Cane just across a roadway on higher ground looked excellent.

The conditions prevailing in the affected portions of this farm were precisely similar to those noted some weeks ago on a farm at Te Kowai where much damage was done by wireworms, and in each instance the attack was confined to the lowest and most poorly-drained parts of the fields.

Most of the injury had been wrought prior to the inspection of the above farm, for in searching in sets for the wireworms, only examples in the pupal stage could be found. Comparison with this, and the species found at Te Kowai recently, showed both to belong to the same species. Specimens from Te Kowai were bred through at the laboratory, and results show that the wireworms (larvæ) are active during the dry season months. They feed naturally on rotten vegetation and humus in soil, but owing to the extreme dryness of the spring and early summer months last year, they resorted more than usual to the cane sets for food and moisture. This also probably accounts for the fact that in all cases of infestation noted, the wireworms were present in the wettest and mostly badly-drained parts of the canefields, evidently concentrating there on account of the moisture remaining in those parts the longest.

Greyback Beetles.

The emergence that took place following the rains late in November last was the main and only one that occurred in the Mackay district, these beetles remaining in flight throughout December, and a few stragglers up to the present time. The beetles that remain up to the present time are in a worn or wasted condition. As stated in last report, as the beetle season advances, the beetles forsake the feeding trees growing on the forest lands and resort more to the scrub trees only. Practically all beetles observed by the writer during the past fortnight were noted on trees occurring along creek banks, or on the edges of scrubs, &c.

There being one general emergence of beetles only, subsequent grub injury will probably show up throughout the district at about the same time, owing to the fact that most of the egg-laying of the beetles occurred about the second and third weeks of December. Experiments along this line were carried out at the laboratory by caging a large number of female grey-back beetles, and results showed that most of the eggs were laid between the 14th and 27th December. None were laid by the caged beetles after 31st December.

If the early summer rains are divided as sometimes happens—i.e., two good falls occurring with two or three weeks of fine weather in between—the beetle emergence is almost always broken up into two smaller emergences; consequently, as the bulk of the beetles' eggs are laid at two different times, the following grub emergences will show up also at different intervals.

The number of eggs deposited by one female beetle varies slightly; from the caged beetles the highest number obtained from one beetle was 36. The average number, however, laid by one female beetle may be safely estimated at from 26 to 28.

Greyback Grubs (*Lepidoderma albohirtum* Waterh.).

Young first-stage grubs of this species are now present in canefields, and as yet are mostly to be found amongst grass roots and cane roots near the surface. They will continue thus for about a month or a little longer in the first stage, when they will moult into the second stage. Some five or six weeks are occupied in this stage, when they again moult and enter the third and most destructive stage. Fumigation, however, should be carried out before the grubs reach this latter stage, which is also before they have done any appreciable injury to the cane plants. During the first two stages the actual injury to cane roots is comparatively negligible when compared with that occasioned by them during the four or five months that they are active in the third stage.

Growers who are troubled with grubs on their farms should look at stools in areas they know to be usually subjected to attack, and if they observe the small grubs in any number at the cane roots, should fumigate with carbon bisulphide or paradichlorobenzene. Information in regard to this will be given on application to the Experiment Station.

Grub injury that is showing up in cane at the present time, or that was noticeable during the past two or three months, is undoubtedly due to grubs of the "frenchi" cane beetle (*Lepidiota frenchi* Blkb.). Fumigation against this species should be carried out about October or November, when the third-stage grubs now in their second year (this species has a two-year life cycle) come up from their resting cells with the advent of warmer weather. This species is sometimes found in successive years in the same "spots" in canefields, so growers noticing their cane wilting from grub attack from October to January or February should investigate by digging at the stools, where the large third-stage grubs will most probably be found. If desired, fumigation may be then carried out, or else the spot marked and the cane fumigated the following season, preferably before the grub injury shows up in the cane leaves.

The principal identifying characters of the greyback (*L. albohirtum* Waterh.) and frenchi (*L. frenchi* Blkb.) grubs is the difference in the arrangement of the hairs or bristles in their anal paths, i.e., the two rows of bristles on the ventral surface of the last body segment. In the greyback grub these bristles run in two parallel lines enclosing a narrow space between them, whilst in the frenchi grub they enclose a small elongate pear-shaped area, the large end of the pear shape being nearest the anal end of the body.

Eggs of Other Species of Beetles.

Other experiments have been carried out in connection with the ovipositing of other species of cane beetles and allied species, details of which will be given in future reports. The following, however, are the maximum numbers of eggs

obtained from one female of each of the following mentioned species of beetle:—Frenchi beetle (*L. frenchi* Blkb.), 26 eggs; Christmas beetle (*Anoplognathus bois-duwali* Boisd.), 17 eggs; another species of *Anoplognathus*, 17 eggs; *Anomala* beetle (*Anomala australasiae* Blkb.), 34 eggs; dusky cane beetle (*Dasygnathus australis* Boisd.), 15 eggs; golden beetle (*Anoplognathus mastersi* Macleay), 8 eggs; and the blue beetle (*Repsinus aeneus* Fab.), 29 eggs.

In the case of each of these, the duration of the incubation of the eggs, &c., is being studied, and it is intended to study the complete life cycle of each of the above species, and in some cases their actual effect on cane plants.

Mr. R. W. Mungomery, the Southern Assistant Entomologist, has submitted the following report for the period November-December, 1928, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

Notes on the Black Beetle (*Pentodon australis* Blkb.)

During the past two years, whilst studying the economy of several of the larger and more important Scarabæid grubs which attack sugar cane in Southern Queensland, our attention has frequently been centred on what is commonly termed the Black Beetle (*Pentodon australis* Blkb.). These beetles, like many other Dynastids, breed well under confined conditions, and during the time that they have been kept under observation at the laboratory, much data has been obtained in relation to their life history. In addition to this, notes have been made of the behaviour of both the larval and adult stages under field conditions, this evidence having been obtained when following ploughs, and by digging &c., and in this manner a considerable amount of information has been amassed. Although all the points connected with the behaviour of this beetle are by no means elucidated, it was thought desirable at this juncture to publish some of the more important details of its life history. By so doing, it is hoped that those who are at present embarrassed by the presence of this beetle on their cane lands, after having gained a more intelligent outlook on the pest, may be able to attack it in a more straightforward manner.

The beetle, which is of a uniformly shining black colour, is from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch in length, female specimens usually being the larger of the two, and it is familiar to most canegrowers since its range of distribution includes practically all the sugar-growing districts of Queensland. Those who are unfamiliar with it are referred to a detailed description of the beetle, by Mr. E. Jarvis, on page 29 of Bulletin No. 3 "Notes on Insects Damaging Sugar-Cane in Queensland." In the South they are met with in the low-lying clay soils of the Pinalba district, and on those farms adjacent to the Maroochy River, where for the most part they eat the eyes and tender shoots of germinating sets, thereby checking growth or producing blanks. In the drier, red volcanic soils of the Isis and Bundaberg districts the same beetle does not appear to give any great trouble. From the evidence of most districts suffering the ravages of this pest, it is apparent that a correlation exists between land growing paspalum grass and the incidence of black beetles on that land, for young cane suffers worst on land which had carried good crops of paspalum grass immediately previous to planting cane there.

Although the beetles are known to feed more or less throughout the year, feeding becomes more pronounced at the commencement of spring, and soon afterwards eggs are produced. The eggs are laid singly in the soil at depths of 6 to 8 inches, and our first records of egg deposition are towards the end of August. The incubation period of the egg is then about twenty-six days at a mean temperature of 63 deg. Fahr. As the spring draws on and the temperature increases, so does the rate of egg deposition increase until a maximum is reached in the months of October and November when the numbers again show a sharp decline. Conjointly with the approach of warmer weather the incubation period steadily lessens, this being nineteen days in October at a mean temperature of 69 deg. Fahr., and fourteen days in December at a mean temperature of 75 deg. Fahr. Soon after hatching from the eggs the young grubs commence to feed actively, ingesting large quantities of soil and rotting vegetation before becoming full grown, and it is from this rotting organic matter that they derive most of their nourishment. In addition to the beetles, these grubs are sometimes responsible for injury to cane, and their chief damage consists in eating into the ends of cane sets and hollowing them out. Thus it will be seen that they are not essentially root eaters like our notorious "furfuracea" and allied grubs.

The duration of the various stages is approximately as follows:—

| | |
|--|---------------|
| First larval instar | 17 to 25 days |
| Second larval instar | 14 to 16 days |
| Third larval instar (including prepupal period) .. | 44 days |
| Pupal period | 14 days |

The entire cycle from the act of oviposition to the appearance of the adult beetle is approximately four months, this being a short life cycle when compared with our more common beetles which have a two-year period. Generally speaking, there is but one generation a year. Those beetles which become adults in the month of February and March, i.e., the result of the main October and November batch of eggs, do not usually commence reproducing until the following spring, but in the case of beetles emerging towards the latter end of December or in January, these may commence reproducing soon after feeding, so that in rare instances two generations may be produced in a year. The fact that in a few isolated cases third-stage grubs of *Pentodon australis* have been found in the field as late as June, supports the possibility of there being two generations under natural conditions, or else these grubs might represent a late production of eggs from the original spring beetles.

The longevity of these beetles is surprising. Unlike other beetles which, after emerging, mating, and extruding their egg supply, die soon afterwards, these beetles produce a few eggs at a time over a long period, and at present we have beetles that have been living in confinement for the past two years. They have produced eggs after each winter and are still active and functioning as though living under normal conditions. These are still being kept under observation to ascertain their maximum span of life in the adult stage.

Control measures are chiefly dependent on the time and method of cultivating the ground, and are such as would readily suggest themselves to anyone conversant with the life history of this pest. *Paspalum* grass land should not be broken up and hurriedly planted with cane. Instead, an interval of two months or more should elapse between ploughings in the spring and summer months so that the insect will be exposed in its larval stages to the numbers of insectivorous birds which usually follow ploughs. If possible, it is desirable that planting be carried out in autumn. If this is not possible on account of wet weather, which is so often a drawback to autumn planting, or should spring planting prove more suitable to that particular district, and it is decided to plant in spring, the land in this case should then have been prepared for planting some time previously and given a bare fallow, when the beetles will be forced to migrate elsewhere for their food supply. Beetles should also be collected and destroyed. The advice previously tendered by the writer in the "Queensland Agricultural Journal," Vol. XXVI., page 482, on the necessity for selecting large plants as an aid in combating this pest, could also be followed with advantage.

***Anoplognathus* spp. (2).**

In company with the preceding species a few examples of slightly smaller though very similar beetles have been collected from guavas, and large numbers from the Blue Gum (*E. tereticornis*) and Moreton Bay Ash (*E. tessellaris*). At first, on account of their similarity, it was thought that they were only sexes of the Christmas Beetle (*A. boisduvali*), but on close examination and finding pairs mating, there was absolutely no doubt as to their being a distinct species.

Examples of both species were brought to the laboratory and caged alive, already large numbers of eggs have been deposited, so it is hoped that their life stages will be bred through this coming season.

A few isolated examples of another smaller Anoplognathid were collected at Peri and Farleigh from Moreton Bay Ash trees (*E. tessellaris*) only.

Anomala Beetles (*Anomala australasiae* Blkb.) in Flight.

This small dark blue-green beetle has been observed singly for some time, but since the more continued rains moderately large numbers have been noted in flight about dusk. The beetles are fond of congregating in groups on the tops of fence posts, stumps, &c. Unlike most of the other cane beetles which are leaf feeders, these insects prefer flowers, the principal of which are those of the common Lantana. Many specimens may be seen at dusk on these bushes, where they eat out the corolla of the flowers. A good many of the beetles have also been observed on Duranta and Frangipanni flowers.

The grubs of this beetle are found mostly in soil which is rich in humus or alluvial deposit, and, where they occur, are usually to be found in fairly large numbers. An allied species (*Anomala orientalis*), is responsible for considerable injury to cane in Java.

Miscellaneous Beetles Noted.

Specimens of the large and well-known Elephant Beetle (*Xylotrupes australicus* Thom.) have been observed flying to light during the past fortnight, and although searches have been made on several Poinciana trees—on which the beetles fed—no examples have so far been found on these trees. This beetle cannot be classed as a cane beetle as its large grubs are only to be found in compost heaps, filter press, heaps of wood shavings, sawdust, &c. incorporated with soil.

Whilst shaking Moreton Bay Ash trees (*E. tessellaris*) odd specimens of the dark blue-green beetle (*Repsinus arcus* Fabr.) and the bright green beetle (*Calloodes rayneri* Macleay) have been collected. A specimen of the latter species was obtained from a guava tree where it was taken in company with Christmas beetles (*A. bois-duvali* Bois.). Isolated specimens of the small true golden beetle (*Anoplognathus mastersi* Macleay) have also been captured whilst flying to light.

Mr. R. W. Mungomery, Southern Assistant Entomologist, has submitted the following report for the period December, 1928, to January, 1929, to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

Coloured Lights as an Attraction for Cane Beetles.

During the annual flight of beetles, which last year took place in December, further investigations were carried out in connection with the reaction displayed by the species *Pseudohopphylla furfuracea* Burm. (i.e., the species commonly met with in the Isis and Woongarra districts) when subjected to the influence of coloured lights. It had been demonstrated some time previously that the trapping of beetles of this species from year to year was not attended by any great benefit in lessening the number of grubs present in these districts in succeeding years, in so much that practically only male beetles were caught, whilst females escaped to reproduce their kind. In selecting coloured lights as a probable means of control, the writer was not sanguine of success on account of the poor results obtained from the past use of the ordinary yellow kerosene light, but it was deemed advisable to determine the degree of response exhibited by this species before abandoning this line of control. The lights used were red, dark blue, pale blue, and green, these being the various colours that were available. The traps were so spaced in the field that the rays from one light did not interfere with the rays from another, and the results of the collections made from the tubs over which each light was suspended are summarised below:—

| Colour of Light. | Male Beetles. | Female Beetles. |
|----------------------|---------------|-----------------|
| 20TH DECEMBER, 1928. | | |
| Red | 176 | 2 |
| Dark Blue | 123 | 0 |
| Green | 307 | 1 |
| Pale Blue | 168 | 6* |
| 21ST DECEMBER, 1928. | | |
| Red | 37 | 0 |
| Dark Blue | 61 | 0 |
| Green | 205 | 0 |
| Pale Blue | 56 | 0 |

* The number of female beetles caught at this trap shows a somewhat higher proportion than in the collections made at the other traps. This might be explained by the fact that there was an attendant at this trap, and it is probable that some beetles may have been picked up on the ground surrounding the trap and placed in the container.

The results of this experiment went to prove that no appreciable benefits were to be derived from the use of coloured lights as a means of trapping beetles, and as it became more apparent on each succeeding night of the flight, this line of investigation was accordingly abandoned.

When Lights are Beneficial.

The use of light traps against insects which are active at night has frequently been the subject of investigation by entomologists, and several experiments have been conducted to prove the usefulness or uselessness of this form of control. Many years ago Slingerland made extensive experiments in America on this subject, and the following is the result of his findings:—

“From 20th May to 1st October nearly 13,000 insects were caught. Seventy-seven per cent. were neutral, 10.4 per cent. beneficial, and 12.6 per cent. often pests; of the pests 79 to 93 per cent. were males; of certain beneficial forms 80 per cent. were females; and as many friends as foes were caught.”

Although trap lanterns can be used with undoubted advantage against some insects, the writer is of the opinion that more benefit is to be derived from lights in locating beetles and collecting them from the objects on which they have settled, than by attempting to attract them to the light itself. In this connection the cane beetle (*Lepidiota frenchi* Blkb.), whose grubs at times do extensive injury to cane on some of the forest lands of the Bundaberg district, lends itself admirably to being collected by means of a lantern or torch. Soon after dusk these beetles emerge and mating pairs are then seen hanging from the cane leaves, fence posts, or shrubs, &c., close to the fields from which they have emerged. Some hours after mating they fly back to the fields to deposit their eggs, and thus the immense advantage to be gained by collecting these beetles is apparent, especially as the collector is assured of a 50-50 ratio in regard to the two sexes. If the female beetles are destroyed before their eggs are laid, this means approximately thirty potential grubs destroyed for each female, and if the collection of this species were systematically carried out, grub infestation in the year following would be materially lessened.

This method is hardly applicable to “furfuracea” beetles, for mating pairs are usually found on the ground and are very inconspicuous against the red soils where their grubs are found. The collector has mainly to rely on his sense of hearing and is attracted to these pairs by the continual buzz which the other beetles surrounding them make. At best, less than one hundred females can be taken on the first night of the emergence by experienced collectors in heavily-infested areas, and this represents a very small proportion of the females which must emerge from that locality. On succeeding nights the numbers taken show a marked decrease.

CANE PEST COMBAT AND CONTROL.

Mr. E. Jarvis, Entomologist at Meringa, has submitted the following report dealing with recent activities of the Meringa Station in connection with control of the adult or beetle condition of *Lepidoderma albobirtum* Waterh. for the period December to January, 1928-29, to the Director of the Bureau of Sugar Experiment Stations:—

Additional Notes on Poisoning Greyback Cockchafers.

This branch of control work was first initiated by the writer in January, 1915, when cage experiments were carried out at the Gordonvale Laboratory to test the effect of arsenical solutions sprayed upon food-plants of this beetle. The result obtained (described fully in Bulletin No. 17, pp. 12 and 13) showed that specimens placed with leaves sprayed with lead arsenate 2 lb., molasses 1 lb., in 50 gallons of water, died about nine days after feeding.

Six years later (1921), when this phase of control was again taken up by the writer, the results from five sets of experiments (comprising 89 cages, each containing a beetle and some sprayed foliage) showed that Paris green 1 lb., lime 1½ lb., in 8 gallons of water, was fatal in from four to seven days (Bulletin No. 17, pp. 70-72).

During December, 1926, this work was continued in order to determine the effect of stronger lead arsenate sprays, and of dry dusting of the leaves with various arsenicals. Excellent results were obtained at this time from foliage sprayed with lead arsenate 2 lb. in 10 gallons of water; the beetles eating such poisoned leaves dying the following day.

Experiments with dust sprays, however, were rendered inconclusive owing to the beetles—both in the treated and control or check cages—having apparently finished feeding prior to their capture from the trees.

Investigations in this connection during the present season (1928-29) have been based largely on the foregoing results derived from laboratory trials; these having been deemed sufficiently encouraging to warrant further study under field conditions.

The apparatus used in this outside work consisted merely of light wood frames made of filleting, covered on the sides and top with mosquito netting, and enclosing a space of 80 cubic feet, which were placed over young trees of *Ficus pilosa*, 4 to 5 feet high, growing at the Experiment Station. The two poisons tried were calcium arsenate and lead arsenate, the former being made up in the proportion of—Sodium arsenite 8 oz., lime (unslaked) 6 lb., water 20 gallons; while the arsenate of lead in the latter spray was applied in the proportion of 8 lb. to 40 gallons of water.

Effect of Arsenate of Lead on Cane Beetles.

In this experiment the wooden bottom of the frame enclosing the fig tree stood upon flat sheets of galvanised iron, on which, close to the stem of the tree, tins of moist soil and other suitable harbour for the beetles during the daytime were placed. One hundred specimens of greyback beetle—which had probably not been on the wing more than about four days—were collected from feeding-trees on 26th November, and enclosed at once in the frame. The foliage of the trap-tree was sprayed with lead arsenate (2.8 formula) to which a little casein had been added to ensure even spreading; the pump used being of the Knapsack pneumatic form, throwing a fine misty spray. Mortality of the beetles commenced after the second night of feeding, continuing at intervals until 5th December, as shown by the following table:—

MORTALITY OF BEETLES EATING LEAVES SPRAYED WITH LEAD ARSENATE.

| 1928. | Beetles alive. | Beetles dead. | Escaped. |
|---------------------|----------------|---------------------------|----------|
| November 26 | 100 | | |
| " 27 | 99 | 1 (female) | |
| " 28 | 85 | 14 (6 males, 8 females) | |
| " 29 | 64 | 13 | 8 |
| " 30 | 54 | 10 | |
| December 1 | 48 | 6 | |
| " 3 | 9 | 35 (12 males, 23 females) | 4 |
| " 5 | 0 | 9 | |
| | 0 | 88 | 11 |

As a result of the above experiment certain data of an interesting nature have been secured with regard to the economy and habits of the cockchafer in question. None of these hundred "greybacks" lived longer than ten days after capture; and, as portions of several of the leaves had been eaten, we may reasonably assume that about 75 per cent. of the beetles either nibbled the edges or devoured small pieces of the poisoned epidermis, as shown by damaged leaves on the tree. Fully 80 per cent. of the specimens harboured during the day in the moist soil provided, although many were usually found resting in a torpid conditions on the sides or corners of the frames, and a few upon the leaves of the fig-tree. A large percentage of the dead beetles was discovered buried in the soil, the remainder lying on the floor of the frame or under debris. The former had probably succumbed to the poison soon after digging at daybreak, while the latter had most likely died during the hours of darkness. In similar frames of netting which were placed over fig-trees on cultivated land, the soil was allowed to form the floor (16 square feet in size), and in such cases practically all the cockchafers passed the day underground, very few remaining on the netting or leaves after daybreak.

Another cage of similar size, which was put over a fig-tree sprayed on 17th November with arsenate of lead (2 lb. to 10 gallons of water) gave a mortality of two female beetles on the following day; proving that lead arsenate when applied at this strength is very deadly to our cockchafer beetle. Furthermore, it does not injure the leaves of such trap-trees or check growth of the budding foliage at ends of the shoots.

Effect of Calcium Arsenite on Cane Beetles.

On 16th November, a young tree of *Ficus pilosa*, about 4 feet 6 inches high, was sprayed with calcium arsenite, mixed in proportion of 8 oz. sodium arsenite, 6 lb. quicklime, in 20 gallons of water. This was enclosed in a netting-covered frame measuring 4 feet by 4 feet by 5 feet high, the lower edge of which was let into the soil to a depth of about 4 inches. Fifty-two newly emerged "greybacks" were then placed under the frame and covered over with moist soil. Unfortunately, conclusive data regarding mortality was not obtainable from the cages let into the soil in this manner, as despite precautions taken to consolidate the ground against the lower edges of such frames, more than half of the imprisoned beetles managed to escape by tunnelling under the lower ground plates. The poison, however, proved fatal after the fifth night, while fifteen beetles were found dead between the dates 21st to 24th November. These figures were probably higher, since the mortality occurring amongst the numerous beetles which had escaped during these four days but which had fed on the poisoned leaves could not be determined. We may gather from results obtained by the abovementioned field experiments that a row of small trap-trees planted about four chains apart on some suitable head-land, and sprayed with lead arsenate as soon as possible after the emergence of "greybacks," should help to materially lessen the numbers of this pest occurring on cane land in the near vicinity.

Those in the habit of collecting these beetles for sale are aware that they show decided preference for certain feeding-trees, upon which they tend to congregate in considerable numbers each season. Many of those visiting trap-trees would probably taste the leaves before passing on, and such slight nibblings would prove fatal a few days later.

Seeing that twelve to fourteen days must elapse after emergence before the commencement of egg-laying, all the beetles visiting such poisoned foliage during a period of at least nine days would perish. In the event of migrating beetles settling in such trees, heavy mortality would be likely to occur; especially amongst assemblages which had travelled several miles without feeding.

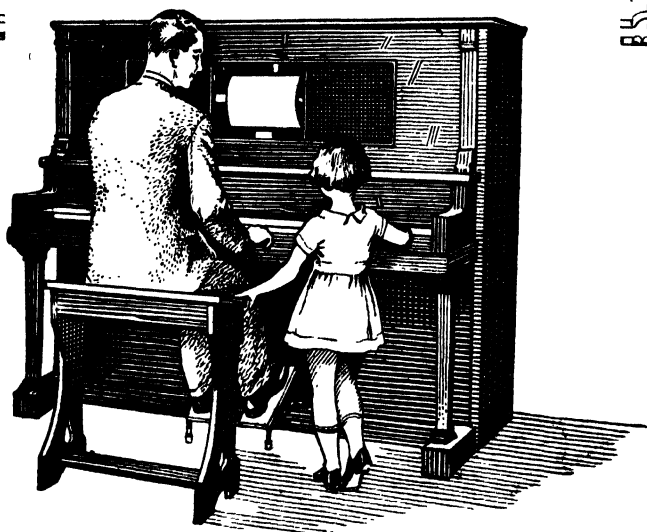
As already suggested in previous reports (Bulletin No. 17, pp. 64 and 65), the best plants to use for trap-trees in the district of Cairns are the Moreton Bay Ash (*Eucalyptus tessalaris*), the Weeping Fig (*Ficus benjamini*), and *Ficus pilosa*. These can be grown with very little trouble from seed or from cuttings planted during the wet season. Such trees should be pruned occasionally, with view to encouraging a low and spreading growth of foliage which can be easily sprayed, or beetles collected from same without difficulty.



Photo.: Jean Easton.]

PLATE 29.

Arable and Pasture Lands on Coochin Coochin.



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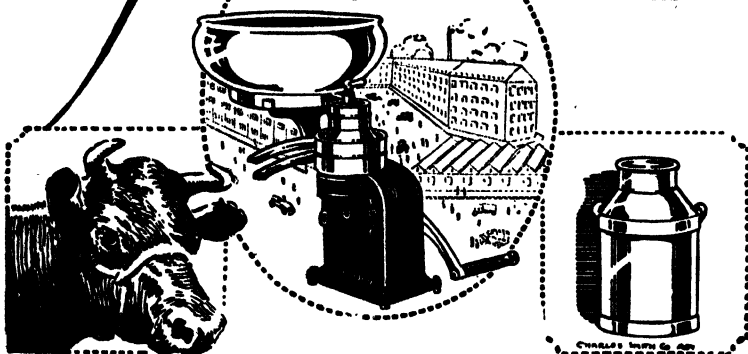
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THE CONTROL OF MEAT ANTS.

By W. A. T. SUMMERVILLE, Entomological Branch.

Although under most conditions the common meat ant (*Iridomyrmex detectus*) can scarcely be considered in the light of a pest, it frequently happens that, when present in very large numbers or when nesting in certain places, they are far from welcome. In the worst cases they do assume pest proportions. It has, therefore, been considered advisable to carry out some trials with a view to determining the most efficient method of control for these insects.

Accordingly, experiments with this object in view have been carried out. As far as possible the work has been done with cheap substances, safe to handle and reasonably easy to procure.

The nests used in the trials were from medium to large in size. These terms are used according to the following standards:—Large nests have a mound of 25 to 35 cubic feet, medium-sized ones a mound 18 to 25 cubic feet, and small ones less than 18 cubic feet.

Of the materials used, by far the best results were obtained with carbon bisulphide, and this substance used as described below can be confidently recommended for the control of the abovementioned species of ant.

However, the results obtained with calcium cyanide are well worthy of note, particularly by such men as happen to have a power blower of some simple type.

In recording the results obtained, it has been considered advisable to include not only the favourable ones but also some unfavourable ones obtained with substances which might otherwise appeal to the farmer.

Summary of Results.

The results obtained with the following seven substances will therefore be given:—

1. Carbon bisulphide.
2. Calcium cyanide.
3. Hot tar.
4. Kerosene.
5. Paradichlorobenzene.
6. Grass and chippings.
7. Hot and cold water.

1. Carbon bisulphide.

From experiments performed with this liquid it was ascertained that used as follows carbon bisulphide is an efficient though not particularly cheap means of control:—

(a) For a medium-sized nest it is necessary to use a little less than half a pint of the compound. The amount for each other size can be calculated directly using the standards as laid down above.

(b) Pour a little into each of the main holes making sure that there is a fairly good distribution throughout the nest.

(c) Immediately cover the nests with sacks.

(d) Wait three or four minutes and then apply a light. The light must be attached to the end of a stick at least 3 or 4 feet long. The bags should be quickly removed and then the light applied in two or three places. The bisulphide is highly inflammable and no risks should be taken when applying the light.

Care must be taken not to explode the gas too soon. If the light be applied in less than the stated time it will be found that there is only a relatively quiet burning taking place, and no explosion causing the galleries to be shattered, occurs. The burning is therefore far less efficient than the exploding.

(e) The explosion is not completed for some minutes. It is therefore advisable to wait about five minutes and then replace the bags over the nest. By again covering the nests the fumes are retained for a longer time and many ants, not killed outright during the explosion or before it, will thus have less chance of recovering.

(f) To obtain the best results it is advised that the work be carried out in the late afternoon at which time there is the greatest number of ants present in the nests.

2. Calcium cyanide.

Two brands of calcium cyanide were used—Cyanogas “A” dust, and Cyanogas “B” dust. Experiments were carried out with amounts varying from 1 to 3½ oz. on different sized nests. The dust was injected by means of (a) hand blow gun; (b) dust gun.

From these experiments the following conclusions have been arrived at:—

(a) The Cyanogas, especially in the form of “A” dust is highly destructive to this species of ant.

(b) The best cheap available means of applying the dust are not at all efficient except for the smallest nests. The pressures which can be produced by these blowers are far too small to force the dust any distance into the large-sized nests.

(c) Owing to the facts outlined in (b) it was not possible to determine the quantity of dust necessary per nest, but results obtained indicate that it would be very small. Indeed, it would appear that if suitable means were available for injecting the dust the cost would be somewhere about one-fifth that of carbon bisulphide.

3. Hot tar.

Hot tar proved to be quite ineffective. It did not reach the queen or immature stages which are usually hidden well down in the nest. It merely blocked up the entrance holes and passages and the surviving adult workers simply set about making fresh openings into the galleries.

4. Kerosene.

Kerosene is equally ineffective for, although fatal to those ants with which it comes in contact in quantity, too much would be necessary to allow of its general use.

5. Paradichlorobenzene.

This substance was tried in fairly heavy dosages but there was no indication that it destroyed or even irritated the ants.

6. Grass Chippings.

It sometimes happens that it is desirable to cause the ants to move from a particular spot. In such cases there is generally no necessity to kill the insects and it will be found that grass or chippings spread fairly thickly over the mound irritates the ants to such an extent that they soon build a new nest elsewhere.

7. Hot and cold water.

Water, hot or cold, pored into the nests several times daily for a few days, was found to cause the ants to move their nest to a new place but did not kill the insects.

OVERFAT PIGS.

It seems that the common practice of fattening bacon pigs in a small pen, where they have an abundance of food, such as maize, milk, and roots, but very little exercise, is the chief cause of overfat pigs coming into the bacon factories.

On most farms where pigs are being topped up for the factory, they are penned in small places, about two months before they are prime weights and then fed very liberally; this, with a lack of exercise and green food, naturally tends to put the required weight on to the pig more in the nature of fat and soft flesh than as firm flesh and little fat.

Over-fatness is not the only trouble we find in pigs which are confined in small pens. In most cases, it is not convenient to have these pens cleaned out frequently and the result is a hothead of filth for the pigs to live in. These conditions are conducive to disease and parasites in the pigs, and while in this condition the pigs will not make the required maximum growth.

Considering the conditions under which we are getting overfat pigs, it would seem that the best way out of the trouble is to graze the pigs either on grass or fodder crops, right from weaning age up to the time they are sent to the factories.

It will be agreed that pigs will run off all their condition and will not fatten properly while grazing in large yards or paddocks, but in practice some progressive farmers are topping off their pigs while on pasture, and these men are quite satisfied. Their pigs are certainly healthy and in good marketable condition when they reach the required weights.

As the Queensland farmer has to market his pigs at a comparatively early age, the animals are still growing fast while they are being topped for the market, and, therefore, need conditions and feed suitable for fast growth more than for fattening. Certainly the best conditions for growing pigs are plenty of exercise and sunlight, with ample feed of good variety and quality.

For those farmers who are dubious about fattening pigs on pasture, it would be advisable to try the scheme with a fair-sized mob of pigs, just to prove for themselves that it pays in every way to run pigs on pasture right from weaning up till the time they leave the farm for the bacon factory.—L. A. DOWNEY, Instructor in Pig Raising.

RURAL ROUTES IN QUEENSLAND.

THE WORK OF THE MAIN ROADS COMMISSION.

In our last issue we reviewed briefly the work of the Main Roads Commission as set out in the Seventh Annual Report. Through the courtesy of the Commission, through its Secretary (Mr. J. E. England), we are now able to present the rest of the plates with which the report was illustrated and which indicate the value of this phase of the widely-embracing rural policy of the Queensland Government.



PLATE 30.—PORTION OF MAIN SOUTH COAST ROAD.
Quartzite gravel bitumen-surfaced 20ft. wide.



PLATE 31.—BRISBANE-IPSWICH ROAD EXPERIMENTAL SECTION.
Bitumen of various grades and varying quantities under test.



PLATE 32.—PINE SHIRE. BRISBANE-GYMPIE ROAD.
Showing stage construction, the final surface being penetration bituminous macadam.

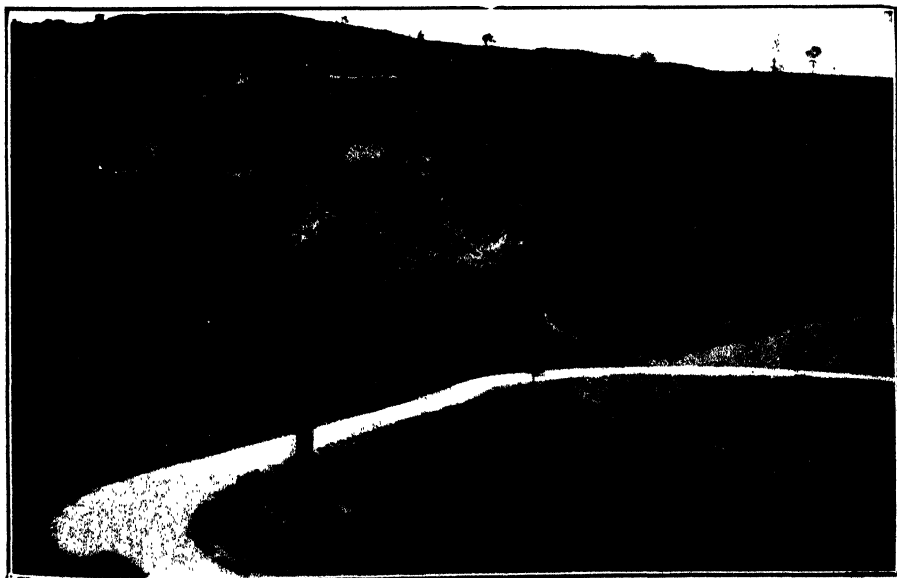


PLATE 33.—NOOSA SHIRE. COORAN-KIN KIN ROAD,
Showing deviation over Range serving fruitgrowers and dairymen.



PLATE 34.—TIARO SHIRE.
Maintenance gravel on old Maryborough-Gympie Road.



PLATE 35.—AYE AND THURINGOWA SHIRES. HAUGHTON RIVER LOW-LEVEL BRIDGE.
Carrying sugar railway (2-ft. gauge) and road traffic.

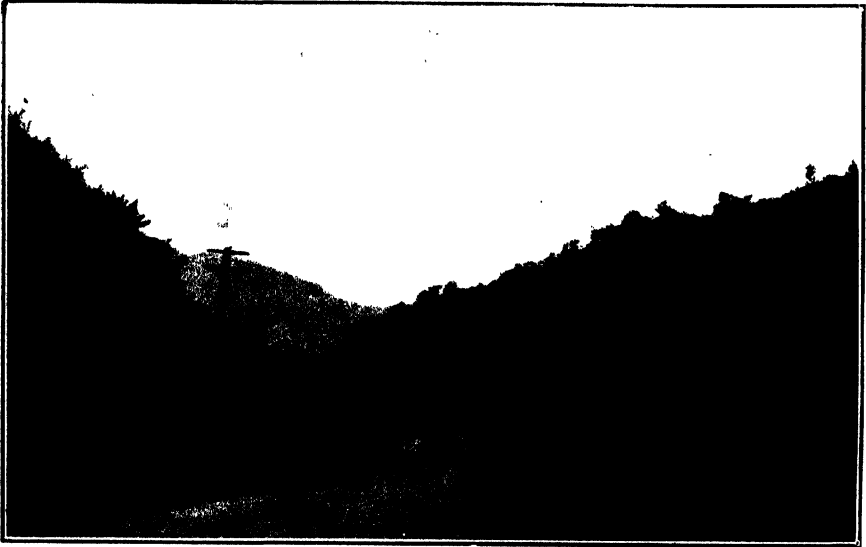


PLATE 36.—CAIRNS SHIRE. ON THE WAY FROM GORDONVALE TO LITTLE MULGRAVE RIVER.
Deviation to improve grade and alignment of old road.

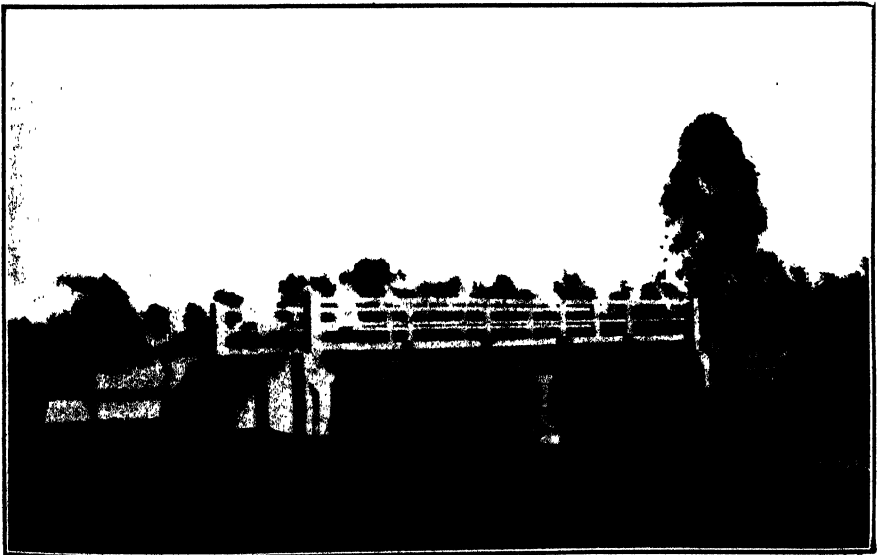


PLATE 37.—AYR SHIRE. BRIDGE OVER BANNISTER'S LAGOON.
Reinforced concrete substructure, timber superstructure.



PLATE 38.—TINABOO SHIRE, NORTH QUEENSLAND.
YOUNGABURRA-LAKE BARRINE ROAD.

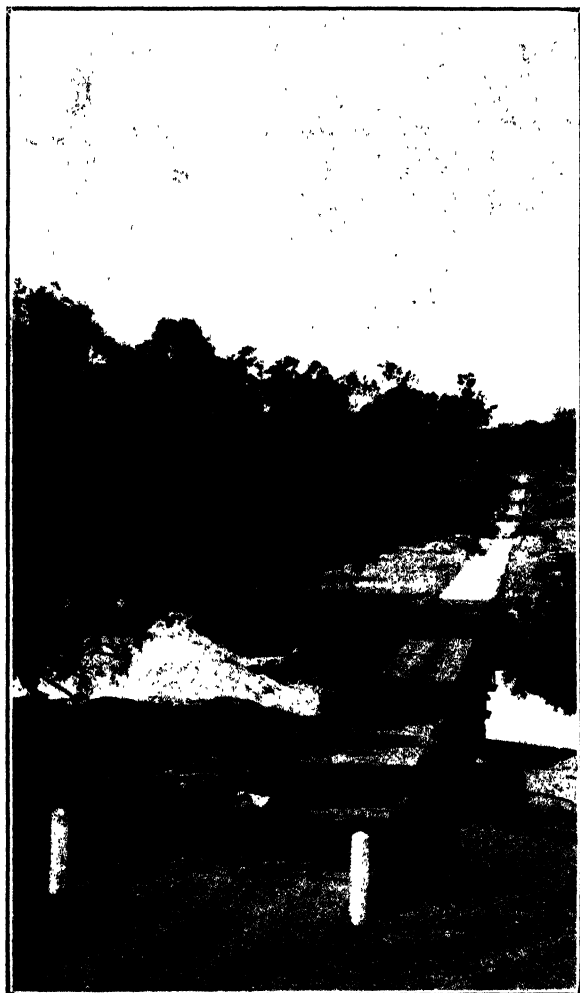


PLATE 39.—WANGARATTA SHIRE. COLLINSVILLE-MOUNT
COOLON ROAD.

Low-level timber bridges and concrete causway over
Bowen River, which have been severely tested by several
floods. Maximum flood level is 60ft. above deck.



PLATE 40.—HERBERTON SHIRE. KABAN-LONGLANDS GAP ROAD.
Showing rubble metal section.

THE "WINSALL" TOMATO.

Mr. M. C. Wood, Toombul, writes:—The tomato known as "Winsall" was raised by Henderson and Company, New York, and was first released by them in 1924. The raisers claim it to be bigger and better than "Ponderosa," and the claim is well justified by the experience of the writer. This is by no means exceptional, as they may be grown to well over 2 lb. in weight without difficulty. The skin is of the same colour as that of "Ponderosa," but the flesh has less pulp, more "meat," and fewer seeds. But, like Ponderosa, it has two faults, i.e., bud dropping and occasionally deformed fruit; however, in spite of the former, very heavy crops are borne. The one illustrated was grown in my garden, not with a view to obtaining great size, but as a test with four other varieties—viz., "Matchless," "Ponderosa," "Walker's Recruit," and "Yates' Erliwinner"—to ascertain which variety the soil suited the best. The soil is a light sandy loam rather deficient in humus. It was heavily dressed with superphosphate and the potash was supplied in the form of wood ashes, both being thoroughly mixed with the soil before planting. Each plant was staked and grown to a single stem. During growth, but after the first fruits had set, the plants received two applications, at an interval of two weeks, of liquid nitrate of soda to keep the sap moving as the season became dry. No other fertiliser was used. Although the season was a particularly dry one, which no doubt accounted for the almost entire absence of the usual fungus troubles, the plants were kept well irrigated with the result that very little (blossom-end rot) developed. "Matchless" was affected slightly, but "Winsall" and "Ponderosa" were practically free.

A JOURNAL OF WIDE INTEREST.

A Ballarat (Victoria) subscriber to the Journal, renewing his subscription for 1929, writes:—

"You are to be congratulated both for the get-up and wide interest of your Journal. It deserves to be read, digested, and prized by all who claim to be lately and credibly informed."

THE AGRICULTURAL POSITION IN QUEENSLAND.

WEATHER AND CROPS

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, has received from his Officers, the following summary of the position of the general agricultural crops in Southern and Central Queensland for the last quarter of 1928.

Weather.

Southern districts were not generally so fortunate in regard to rainfall as those in the Northern and Central portions of the State. Useful rains, however, were experienced, but the storms were more or less irregular and patchy in character. Reports from the closely settled areas of the Boonah district are to the effect that dry weather has seriously affected production, although a considerable area of land was prepared for the sowing of seasonable crops. It is expected that several thousand acres of maize will be planted after the heavy rain which fell on the 31st December. Crops for green fodder purposes will about equal the area planted last year. The Beaudesert district appears to be more fortunate in regard to thunderstorms, many of which were experienced during November and December, and as a result forage crops were extensively planted. Generally speaking, these and other crops are showing good growth and promise.

Wheat.

From the latest information made available by the Secretary of the State Wheat Pool, it is estimated that the 1928 harvest will approximate two and three-quarter million bushels of grain, the quality of which was fair to good. Crops sown on early and well-prepared land made the best growth and returned the heaviest yields. On the other hand, late sown areas suffered from a run of dry weather in August and September; the October rains wrought a wonderful improvement in all wheat crops, and in some instances the yields were high, a few fields returning in excess of 40 bushels per acre. Unfortunately, some of the late planted areas, particularly on the red soils in the neighbourhood of Clifton yielded very lightly. Notwithstanding this fact the average yield should be a little above normal.

Maize.

In most districts in Southern Queensland the sowing of early maize crops was considerably delayed owing to the dry spring. However, matters were more favourable this year than last in the Kingaroy district; here, a considerable increase was noted in the area planted with maize. This may have been influenced by the somewhat unsatisfactory conditions existing in the peanut industry.

Peanuts.

Approximately 6,000 acres will be planted with peanuts this year. Many fields cropped last year with peanuts have been planted with maize. Good progress is being made with the peanut storage and treatment plant at Kingaroy.

The Lockyer district was fortunate in experiencing good, useful rains during October and early November, and crops are now to be seen in all stages of growth. Haymaking is in full swing and the early maize crop is fairly promising and should yield at least a three-quarter crop. The early crop of pumpkins is generally light, but the later planted areas should give a more satisfactory return.

In the Harrisville district many of the early sown crops failed on account of the dry weather; rain which fell, however, during December entirely altered the position, and lucerne and other crops are now making good progress. Extensive plantings of summer fodder crops, chiefly White Panicum, Japanese Millet, and Sorghum have been made throughout the district. The area under maize is also fairly extensive; it being expected that about 8,000 acres will be cropped. Pumpkins have also been planted extensively, and heavy plantings of potatoes are anticipated for the winter crop.

Very favourable reports have been received from the Pittsworth district, where all classes of fodder crops intended for grazing-off purposes are doing well. Sudan Grass for this purpose has been largely sown. Both the early and late planted maize crops are in fairly satisfactory condition, and the harvesting of lucerne crops has latterly been general.

The Crow's Nest district does not appear to have participated in the early storms. The growth of pastures has been retarded and crops generally have suffered from lack of sufficient rain. Many fields have been lying fallow for some time awaiting sufficient moisture to ensure a satisfactory germination of seed. Generally

speaking of conditions in Southern Queensland, it is to be remarked that a good general rainfall is badly needed in order that pastures and crops may make sufficient headway during warm growing conditions.

Central and Mackay Districts.

Reports from the Central and Mackay districts indicate that heavy rainfall was experienced at Mackay, Sarina, and Carmilla, and the soil in many places has been over-saturated so much so that crop growth has been retarded. Additionally, it has not been possible to cope with weed growth owing to the sodden nature of the land. From St. Lawrence to Rockhampton the rainfall, although of a patchy nature, has been sufficient to provide abundance of feed. South of Rockhampton to Bundaberg fair rains have fallen; natural pastures are in fair condition, but further rains are required to ensure satisfactory crops of maize, &c.

The Dawson, Callide, Springsure, and Capella districts have all been favoured with useful rains, and the season, particularly in the Emerald-Springsure and Emerald-Clermont districts is exceptionally good. Crop prospects in the Central district are reasonably good for the next three months, and even if the rainfall happens to be of a scanty nature natural feed for dairy stock should be sufficiently plentiful. Crops intended for pig-raising purposes are generally in evidence throughout the Dawson and Callide districts and are making good progress.

So far as dairying is concerned, the condition of the pastures varies considerably through the dairying districts. As a result of storm rains good growth of pastures has resulted, while in other portions, both on the coastal and Downs, the pastures are scant, such areas not having benefited by rains.

The supply of water is generally adequate, but in some localities the dams are getting low.

The condition of stock generally is from fair to excellent; the great majority, however, are in good condition.

More attention is being given to herd testing generally, and it is pleasing to note that the field officers are taking a direct interest in this important branch of the industry. The Herts Testing Staff are at the present time fully occupied with their duties. Field officers report that the introduction of better class dairy bulls is receiving attention, and the Dairy Cattle Improvement Subsidy Scheme has been instrumental in interesting dairy farmers generally in the matter of breeding high class dairy animals.

At the present period the output of dairy products, on the average, is approximately normal. Should rain of a soaking nature fall over the dairying districts in the near future a rapid increase of dairy products will take place, resulting in an output above normal.

In the absence of rain and the high temperature prevailing, it appears that the output of dairy products will decrease as the green succulent pastures require further rainfall to ensure maturity.

The spring and early summer was generally dry through the dairying areas of the State, and early planted fodder crops were a failure. During the latter period of the year electric disturbances resulted in beneficial falls of rain over a good portion of the areas devoted to dairying throughout the State. There are, however, isolated areas on the coast and Darling Downs which have not as yet benefited by a serviceable rainfall. In these places pastures are scant and there is an absence of fodder crops. The falls of rain, the results of electrical disturbances, were of a heavy nature, but general rain is generally needed to ensure ample supplies of natural pasturage and fodder crops for the late summer and autumn period. Owing to an absence of spring and early summer rains the areas usually planted with fodder crops are below the average. The time of planting autumn and winter crops for fodder purposes is approaching and large areas will be seeded.

AN INSTRUCTIVE JOURNAL.

A subscriber at Samarai, Papua, renewing his subscription for a further two years, writes:—"I should like to express my admiration at the excellence of the articles in the Journal from an instructive standpoint, as well as for the continuous improvement in the Journal generally as time goes on."

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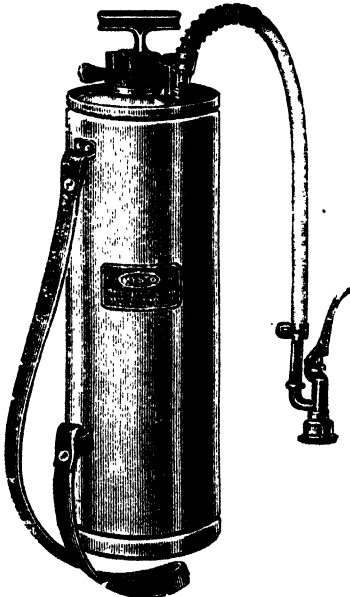
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PIG RAISING IN QUEENSLAND.

SOME ECONOMIC PHASES.

In this article Pig Raising is dealt with as one of the industries associated with Dairying and Mixed Farming, in which every farmer in Queensland is interested.

As with other branches of agriculture, the production of pigs is a business requiring specialised knowledge, though it may appear to the uninitiated there is nothing to be learned about feeding and handling pigs. The business is not one requiring a large capital nor an expensive plant, particularly where it is associated with dairying and general farming; the provision of abundant supplies of suitable foods, a liberal water supply, clean, comfortable accommodation, and necessary utensils are among the principal requirements. To the specialist who intends devoting the whole of his time to pig raising on commercial lines, the business runs along different lines to a combination of cows and pigs.

Not alone should careful consideration be given to the financial side of the proposition at the outset, but continuous attention is necessary to factors that determine the profit and loss in the carrying out of the activities. It is particularly these phases that this article seeks to elucidate.

ECONOMIC FACTORS.

The economic factors in pig raising are--

1. The man, his methods and capital.
2. The farm and the climatic conditions.
3. The food supply and its relationship to seasonal rainfall.
4. The stock, their care and management.
5. The markets and their demands.
6. Pig prices and future prospects.

Special Attractions of Pig Raising in Queensland.

Climatic conditions in Queensland, while variable in regard to rainfall, are conducive to the production of healthy stock under conditions favourable to early maturity. Dry-farming systems plus suitable varieties of grain have enabled the wheat farmer to largely overcome variable seasons, and on better methods and conservation of food and water the pig farmer must also largely depend.

Other factors worthy of note in the production of pigs are the comparatively small amount of capital required to engage in the business; the ease with which one may enter into or retire from the ranks of pig farmers; the quick and profitable turnover; and the comparative freedom from risk of calamity. If the pigs and piggeries are kept under hygienic conditions such as are favourable to health and the development of animals naturally suited to forced feeding and early maturity, there are not likely to occur any serious avoidable losses.

It is worthy of note also that pigs are particularly healthy in Queensland, and that climatic conditions are equable and specially suited to open-air systems of stock raising. In this regard Queensland compares more than favourably with any other country in the world.

Systems of Pig Raising in Queensland.

Pig raising in Queensland is usually carried on along the following lines:—

(1) In conjunction with dairy farming in which skim milk, whey, or (in fewer cases) buttermilk, form the major portion of the food used. The system combines the feeding of dairy products and farm-grown crops, and is invariably regarded as the safest and surest road to profit, in the keeping of pigs. More than 90 per cent. of the pork produced in Queensland could be classed as "dairy-fed pork," a food product in universal demand the world over at top price.

(2) Pigs in conjunction with mixed farming, combining the growing of grain (corn, barley, wheat, &c.), green crops and roots, &c. This system, while quite a practicable one, is mostly regarded as carrying more risk than where cows and pigs are combined. There is, however, no reason why the system should not be successful, but it necessitates the cultivation of crops, and in that sense is more dependent upon seasons of liberal rainfall. The system of utilising milch cows to consume grass and green crops in the production of milk, of which a proportion—minus the cream—is used for pig-feeding purposes, appears to be preferred throughout Australia.

(3) Pigs as a special line where fed on buttermilk, grain, greenstuff, &c. This system operates in conjunction with butter factories, and, in fewer instances, in conjunction with cheese factories where supplies of whey are available, and under expert management is a profitable undertaking. The system requires a much wider knowledge of the business and closer detailed attention. It is not, however, likely to expand much as the principal butter factories (with a few exceptions) have now installed machinery to convert the liquid buttermilk into buttermilk powder, a concentrated product in increasing demand and yielding a higher return than the fluid product.

(4) Pigs on farms where they are fed on the waste food from hotels, cafés, manufacturing establishments, produce markets, &c. Though this system of pig feeding is not at present as extensively carried out in Queensland as in the more populous Southern States, there are numerous suburban and metropolitan pig farms. The business under expert control is a highly profitable one, but as in the case of (3) requires a larger capital and a wider knowledge of the methods of feeding and handling. The business is also one necessitating long hours and considerable labour in collecting food and in transport, and is highly specialised. It is often conducted in conjunction with poultry farming. The system includes piggeries conducted by Government Departments at Mental Hospitals and other institutions, and piggeries run in conjunction with butchering establishments.

(5) Stud piggeries associated with dairy farming and commercial pig farming ventures, or on a small scale under the general heading of suburban pig farms, or as a specialised business at Agricultural Colleges and State Experiment Farms. The stud pig business is one requiring a special knowledge, and needs to be conducted on strictly business lines to

be a success. The capital required depends entirely upon the scope of the business, though stud breeding has its limitations, and is more profitable when conducted in conjunction with one of the other systems referred to than as a special line of work. There is, however, ample scope for enthusiastic and capable men to develop this class of pig farming.

(6) Junior Pig Farmers. Included in this section are those enthusiastic and progressive members of Pig Clubs whose operations, while



PLATE 41.

FIG. 1.—An unprofitable and expensive litter, sometimes referred to as “a pretty but unprofitable lot.” Unless breeding sows rear two litters per year of at least eight pigs in each litter, they are not profitable, and should promptly be replaced with more prolific strains. Prolific strains can be obtained if breeders invest in the best it is possible to secure.

conducted on a limited scale, are of importance to the industry. As the Pig Club movement expands thousands of club members will be enrolled, many of whom will eventually enter the ranks of senior pig farmers.

Number of Breeding Sows Required.

Where pig raising is conducted as an adjunct to dairying, it will be found, as a general rule, that one breeding sow to every ten cows, in milk, will be about the correct proportion to keep. Experience proves that the farmer milking sixty cows comfortably handles six sows and one boar together with young pigs, provided some additional food is grown or purchased to supplement the milk. If accommodation and additional food supplies are available, or if other systems of pig raising are followed, it may be possible to increase the number of pigs kept, but it is better to have food to spare than to lose money by having more pigs than can be comfortably fed and profitably produced.

Pigs should not be used for breeding before they are ten months old, and if carefully handled and kept in reasonable breeding condition both sows and boars should be productive up to the age of six years or even eight years.

The Importance of Correct Feeding.

The whole subject of foods and feeding is of very great importance to the farming community. The Department of Agriculture and Stock has in course of preparation a complete treatise on this important subject.

Milk.—Skim milk, butter-milk, and whey are all excellent foods for the purpose of pig feeding, but their value may be considerably enhanced by balancing them up with concentrated foods, mineral matters, and greenstuff. Clean drinking water in a separate trough is always necessary even where these by-products of the dairy form part of the food.

Greenfoods.—Succulent greenstuff should form from 25 to 30 per cent. of the food supply at all seasons of the year, and where green food is not available, lucerne hay or lucerne chaff (soaked in water when first being used) should be substituted. Green lucerne, rape, barley, wheat, oats, sorghums, green cornstalks, pumpkins, melons, grasses, &c., are all advised.

Root Crops.—Of these, sweet potatoes, artichokes, unmarketable English potatoes, and mangel wurzels are recommended as being reliable, nutritious, and economical additions to the list of foods. Peanuts may be used in the feeding of very young pigs and breeding stock, but should be omitted from the rations of fattening pigs.

Grain Crops.—Corn, wheat, barley, oats, peas, grain sorghums, &c., are all advised together with the meals resultant from grinding these grains (maize meal, wheat meal, barley meal, pea meal, pollard, bran, milo meal, &c.), but care should be taken not to feed an excess of fattening food such as maize, peanuts, or even milk, otherwise the pork and bacon may be too fat and of much lower value than would be the case if balanced rations were fed. Even pigs of correct factory weights are often over-fat and unsuited to trade requirements. *This is a point that must not be overlooked.*

Concentrated Foods, Meals, and Mineral Mixtures.—Meals such as protein meal, meat and bone meal, specially prepared pig meal, &c., all provide useful and necessary supplements to the foods used, those supplying protein (flesh formers) being specially advised. Mineral mixtures supplying bone-forming elements (lime, potash, phosphates, &c.), charcoal, wood ashes, bone meal, &c., become more necessary every year, and are, without doubt, very profitable additions to the daily food supply. Other foodstuffs such as molasses, lime water and linseed meals have a place, too, but need to be used judiciously, otherwise unnecessary waste will result.

Vitamins (health and energy producers).—These must be supplied per medium of balanced rations in which green foods have a part.

Water.—A permanent supply of *clean drinking water* is absolutely essential for all classes of live stock.

Notes on Feeding.

Pigs have big appetites; they must consume large quantities of nutritious food to enable them to develop and mature early, for with a capacity as baconers to reach 170 lb. live weight in 170 days from birth (birth weight about 2 lb.), and with a ratio of approximately 4 to 5 lb. of food (dry matter) plus water to each pound of pork produced, it will be seen that the modern "pork-making machines" must be fed. It is a mistake to think that pigs can be produced at a profit at no cost at all. The farmer should keep books and ascertain just how he stands in regard to these matters. Seasonal conditions would not hinder our



PLATE 42.

FIG. 2.—Early maturing bacon pig, of a mellow desirable type, and of correct factory age and weight. Note evenness of development—light forequarter and fine quality skin and hair, indications of a healthy vigorous constitution. Pigs such as this will always realise top price. Live weight 170 lb. at six months of age.

progress if we conserved food and water and worked more along sound progressive lines.

Ask for the pamphlets on "Foods and Feeding," "Stock Foods," &c., to be supplied to you as soon as available.

Breeding for Profit.

Efficient management is an important factor in the success of every business, and as a business pig raising must be conducted efficiently to be profitable. No other than purebred boars should be used, and the brood sows should carry all the breeding possible! If they are purebred so much the better. Mongrel stock pay no profits.

Good quality breeding sows are procurable (January 1929) up to twelve months of age at from £3 13s. 6d. at twelve weeks to about £12 12s. each. The higher-priced animals would probably be quoted as being in-pig, twelve months in age, and right at the productive stage. Pedigreed boars of the various breeds are available at from £4 14s. 6d. at twelve

weeks old to £12 12s. or more at twelve months old. Specially selected animals at higher prices than these may also be obtained.

It has been said that "Half the Breeding is in the Feeding," though it would be equally true in pig breeding to add that it is impossible to expect good results from feeding inferior quality, slow-growing strains of pigs. A good sow mated to a superior quality boar will produce pigs worth twice as much as those produced by mongrel stock, while cost of production is lower in the former than in the latter. It is not to be expected that pigs will grow rapidly and produce profitable returns unless improved breeding and selection go hand in hand with correct feeding and management.

Breeding sows should produce two litters per year of at least eight pigs in each litter. Assuming that a sow rears six pigs in each litter, and that these pigs are worth £3 10s. each as bacon pigs when between five and six months of age, a gross return of £21 per litter or £42 per sow per year after the first year should be possible, and at the end of the year the sow herself should be carrying another litter of pigs worth practically £1 each at birth.

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|--|
| IT DOES NOT PAY TO HANDLE INFERIOR TYPES OF PIGS. |
|--|

But many pig raisers are keeping unprofitable sows. There is big scope for improvement here.

The pig industry suffers considerable economic loss each year through the retention on farms of unsatisfactory breeding sows, i.e., sows only producing one litter of less than eight pigs per year instead of two of more than eight each, and through the use of crossbred, mongrel, lazy, and unproductive boars.

Special Note.—Unfortunately many farmers depend upon the purchase of store pigs, and for these, at times, high prices are paid, and the margin of profit is considerably reduced. It is desired to advise producers against relying unduly upon the fattening of store pigs for profit, and to stress the value of breeding the pigs on the farm. The purchase of store pigs at comparatively high prices for sale later as baconers at an uncertain value is not in the best interests of the producer nor the business, nor are the risks involved to be recommended.

Experience in Queensland proves that where pig raising is conducted on proper lines it is a profitable undertaking; it indicates that the business is one from which farmers in every part of the country are making satisfactory returns.

Care of Young Pigs.

The profitable pig should grow rapidly, mature early, and reach the bacon factory at the earliest possible age, at the lowest cost of production, with the least amount of labour, and with the maximum of saleable meat and a minimum of waste.

The business of the pig farmer is to help the pigs in their progress from birth to factory, and to market them in the most attractive and desirable form.

The time to begin caring for pigs is long before they are born, for the strength and development of the pigs at birth depends entirely upon the feed, care, and attention given to their mothers, and the type and quality of the sires. The Departmental pamphlets dealing with "Selection of Boar and Sow," "Feeding the Pig," "Weaning the Pig," "Castration of Pigs," &c., all carry much valuable information on this phase of the business, and to these pamphlets readers are referred. The pamphlets are free on request at the Department of Agriculture and Stock, Brisbane.

DISEASES OF PIGS.

Prevention is Better than Cure.

The factor of importance in the ultimate profit to the individual pig raiser concerns the exercise of care in the prevention of disease. The ravages of Swine Fever and Foot and Mouth Disease, &c., in other parts of the world indicate the absolute necessity for strict attention to hygiene, and to keeping nothing but the healthiest animals obtainable under conditions as near perfect as possible. Fortunately, stock in this country are exceptionally healthy, our conditions favour quick growth and early maturity, and we have but little fear of calamity through the more serious infectious and contagious diseases.

Losses through disease and parasitic infestation are, however, sufficiently serious to warrant the closest investigation and to require that the strictest measures be observed in all operations associated with the business.

Investigations into the incidence of disease among pigs are undertaken by veterinary officers of the Department of Agriculture as required from time to time, the object being to definitely locate the origin and whereabouts of the principal diseases among pigs.

These investigations are followed up by visits of Departmental officers to the farms upon which the diseased animals were located. Reports and "Follow up" correspondence with the farmer aim at clearing up the troubles and freeing the stock and farm of disease. A pamphlet dealing with "Diseases of the Pig" and suggested lines of preventive measures and treatment is in course of preparation. **Ask for a copy to be posted to your address as soon as available.** Write the Department at once if you experience any trouble amongst your pigs.

Proper Housing will Aid in Profit Making.

The pig has frequently been designated as the "gentleman who pays the rent," "the mortgage lifter," &c. The appellations have much truth in them. The pig is a money maker, but the "gentleman who pays the rent" is too often left without a house or paddock for himself although he is expected to pay the rent for his owner. Time was when "wallowing in the mire" was deemed to be the natural environment and preference of the pig, and nothing more was deemed necessary or desirable. Times have changed, and to-day there is no greater fallacy than that the pig's natural environment is in a filthy, dark, low, ill-ventilated dungeon. The fact is that, in pig raising as in other avenues of life, "Cleanliness is next to Godliness," and is an absolute necessity in any system of pig farming. With climatic conditions as they are in Queensland expensive pigsty accommodation is unnecessary; it is much more profitable to spend the money on the purchase of wire-netting, barbed wire, and cheap, convenient, comfortable open-fronted shelter-sheds than on the more elaborate pigsties thought so necessary years ago and still an advantage in colder countries. Pig paddocks, not pig

**Our slogan should be not necessarily more, but
BETTER PIGS ON EVERY FARM.**

yards or pens, should be the objective, for even pigs being topped up for the market will finish off much better if allowed liberal exercise and green foods than if penned up continuously and fed chiefly on grain. Breeding sows should not be penned up continuously, but should have large grassy paddocks in which to graze. It is, however, an advantage to confine very young pigs in roomy pens; also sows with very young litters. Write to the Department of Agriculture and Stock for information relative to these matters, and state the conditions under which your pigs are being controlled.

Losses in Transit.

It is not sufficiently realised that the profits from the breeding and feeding of pigs on the farm may be seriously reduced by careless handling and by bruising. Though the pig has a stubborn temperament and is not always ready and willing to travel in a direction contrary to his liking it is surprising how readily he may be handled if those in charge have patience and avoid reprisals. A visit to the bacon factory and inspection of bruised and damaged carcasses, hams, &c., impresses one with the necessity for care in handling, for there one notices hams and fitches showing distinct evidence of boot and whip marks and other injuries to the flesh which, in the aggregate, result in heavy financial loss to the producers. Visits by parties of farmers to bacon factories for the purpose of becoming more conversant with all these details are strongly recom-

mended. The instructors will accompany such parties if advised in ample time beforehand. Every farmer should make a point of coming into personal contact with those who are engaged in the manufacture and sale of the product from the stock they are producing. The system of transport of pigs organised by the Northern Pig Board in Queensland

SEVEN POINTS ON COST REDUCTION.

As it is essential that the costs of production be kept at the lowest possible level the attention of readers is drawn to seven points in cost reduction, all of which have a direct bearing on control of the business on the farm.

Reduce your production costs by—

(1) The growth and use on the farm of as large a proportion of the food supply as is possible.

(2) The use of a liberal supply of flesh- and bone-forming materials, as well as fat formers; we invariably use too much cob corn (grain) and too little green corn (greenstuff). The pigs on most farms have too limited a supply of drinking water, greenstuff, and mineral matters; add these to the ration and mark the difference.

(3) Allowing the young pigs to suckle the sow till they are at least eight weeks old, in preference to weaning them at six weeks. This is well worth a trial. Castration of male pigs before weaning is strongly advised.

(4) Keeping only the most prolific sows and those that produce the most milk—cull out the weedy, unproductive sorts, the non-rent payers. Three good sows are better than six mongrels. Pigs are only rent payers when bred and fed along the correct lines.

(5) Keeping a purebred boar, selected from prolific, "milky" strains of healthy well developed stock. This applies also to sows. It is an unfalling axiom of stock breeding that "Like produces Like."

(6) Remembering that the more pigs reared per litter and the more pigs reared per sow per year, the cheaper the cost of production of those marketed.

(7) Raising pigs of the most desirable quality within the desired weights, marketing them at the earliest possible age and with a minimum of waste.

Explanatory Note.

It should be noted that the terms "Cost of Production" and "Cost Reduction" do not necessarily refer only to cost of feeding or to the value of the foods consumed; there are other economic factors influencing production costs.

is worth emulation. The Board has reduced costs of transport and losses in transit to a minimum without any inconvenience to the producers. In transport exists a field for organised co-operation of pig raisers in other parts of the State.

There is an economic loss to the industry through railway pig wagons travelling long distances carrying fewer pigs than their maximum capacity allows. In the transport of pigs by rail (loose in wagon)

half or full truck rates invariably apply; if a pig wagon with a capacity of seventy bacon pigs carries say, only fifty pigs, this number of animals is charged for at the full truck rate (seventy pigs) and the cost of freight per pig is 25 per cent. higher than it ought to be. Similarly, if ninety pigs are delivered to the railway station for trucking to the one destination on the same day, two pig wagons would have to be utilised, and in this case one full truck (seventy pigs) and one half truck (thirty-five pigs) would be charged for and ninety pigs would pay the freight ordinarily paid for 105 head. There is also less damage through bruising when pig wagons are loaded to their maximum capacity than is the case where fewer animals are forwarded. This suggests the advantages of greater effort in the direction of co-operative trucking. An appreciable saving in freight and loss reduces cost of production and increases the profits.

The loss to the industry through bruising and damage in transit and through condemnation at slaughter, in part or whole, also increases the cost of production of the stock marketed to a considerable extent and necessarily reduces profits. These and other avoidable losses are often overlooked by the producer on the farm. Farmers should consult their factory representatives regarding all these matters.

What Pig Industry Statistics Teach.

The latest figures available indicate that the human population and the numbers of pigs in some of the principal pig-raising countries throughout the world are approximately as follows. The percentage of pigs per cent. of human population is stated in the fourth column.

PIG-RAISING STATISTICS.
(From Stateman's Year Book for 1928.)

| Name of Country. | Number of Pigs. | Number of Inhabitants. | Number of Pigs per cent. of population. |
|------------------------------------|-----------------|------------------------|---|
| Denmark | 3,728,623 | 3,434,555 | 108.56 |
| United States of America | 58,969,000 | 105,720,620 | 55.77 |
| Canada | 4,470,771 | 8,788,483 | 50.87 |
| Irish Free State | 1,177,637 | 2,972,800 | 39.61 |
| New Zealand | 520,143 | 1,344,384 | 38.69 |
| Germany | 22,880,318 | 63,180,619 | 36.21 |
| South America | 20,652,000 | 66,512,885 | 31.04 |
| Hungary | 2,386,664 | 8,457,852 | 28.21 |
| Spain | 5,267,328 | 22,290,162 | 23.63 |
| Yugoslavia | 2,806,182 | 12,017,323 | 23.35 |
| Queensland | 191,947 | 897,419 | 21.38 |
| Tasmania | 38,906 | 210,529 | 18.48 |
| West Australia | 69,798 | 385,043 | 18.12 |
| Victoria | 284,271 | 1,726,445 | 16.46 |
| New South Wales | 332,921 | 2,361,930 | 14.09 |
| South Australia | 79,108 | 570,900 | 13.85 |
| Great Britain and North of Ireland | 3,124,412 | 45,448,000 | 6.87 |

The figures quoted above are from the latest information available though it does not follow that they represent the census for the same period throughout.

The figures indicate the possibilities of the pig-raising industry if judiciously organised and controlled; they also emphasise that in comparison with the development that has taken place in other countries, the industry is as yet in its infancy in Queensland, this, especially so, considering the vast tracts of fertile country not yet in a productive stage from the pig farming point of view. Denmark, it will be noted, is in reality, the most important pig-raising country in the world, for with a human population approximately 50 per cent. less than Australia she has more than five times the number of pigs per cent. of human population than we are credited with. Here is emphasised the value of pig raising as an adjunct to dairying in centres suited to a combination of these two important branches of farming. Denmark's success should be an incentive to Australians to make still further progress, though here it would be well to remark that in advocating expansion of the industry we do so with the full knowledge that it is essential to improve the quality if quantity is to be increased.

Some Notes on Production and Consumption.

Experience in Queensland proves that, following on any dry spell in the weather, there is invariably a rapid return to normal conditions and appreciably increased production during periods characterised by liberal rainfall.

Adverse seasonal conditions constitute one of our greatest problems, but as they are inseparable from agricultural development in sub-tropical countries they must be taken into account, and in consideration of our problems must of necessity be faced. Other industries both agricultural and industrial have their "ups and downs," and in this respect the pig farmer is no better or no worse than his neighbours; **increased efficiency and reduced costs of production together with more co-operative effort** in the manufacture and distribution of the finished products will always prove of immense advantage no matter in what condition the pork products market may be.

From a study of available statistics the position appears as follows:—

In 1926-27 the bacon and ham produced in Australia totalled 73,634,888 lb.; the exports were 1,833,832 lb. and imports 374,824 lb., leaving a surplus of 1,459,008 lb. of exports over imports. The total consumption requirement for the Commonwealth, therefore, was 72,175,880 lb. or on an average 12.05 lb. per head of population. The total exports exceeded the imports by 1,459,018 lb. An increased consumption of slightly more than 3 oz. per head of population per annum would absorb the whole of the surplus production.

This increased consumption necessitates better pork products, the quality of which is contingent upon the class of pig raised. An all round improvement in quality is therefore necessary to insure future success and expansion. Increased local consumption also means less surplus and more reliable prices for the products available.

According to the Commonwealth Statistician, of the total of 244 lb. of meat, which every Australian consumes during the year, only 11 lb.



PLATE 43.

FIG. 3.—Carcass of bacon pig reduced in value more than 50 per cent. through over-feeding and holding the pig too long on the farm. Bacon pigs of this description were in demand many years ago, but during recent years they have become exceedingly unpopular and unprofitable. Note short, thick-set body, heavy forequarter, and short "bully" neck.

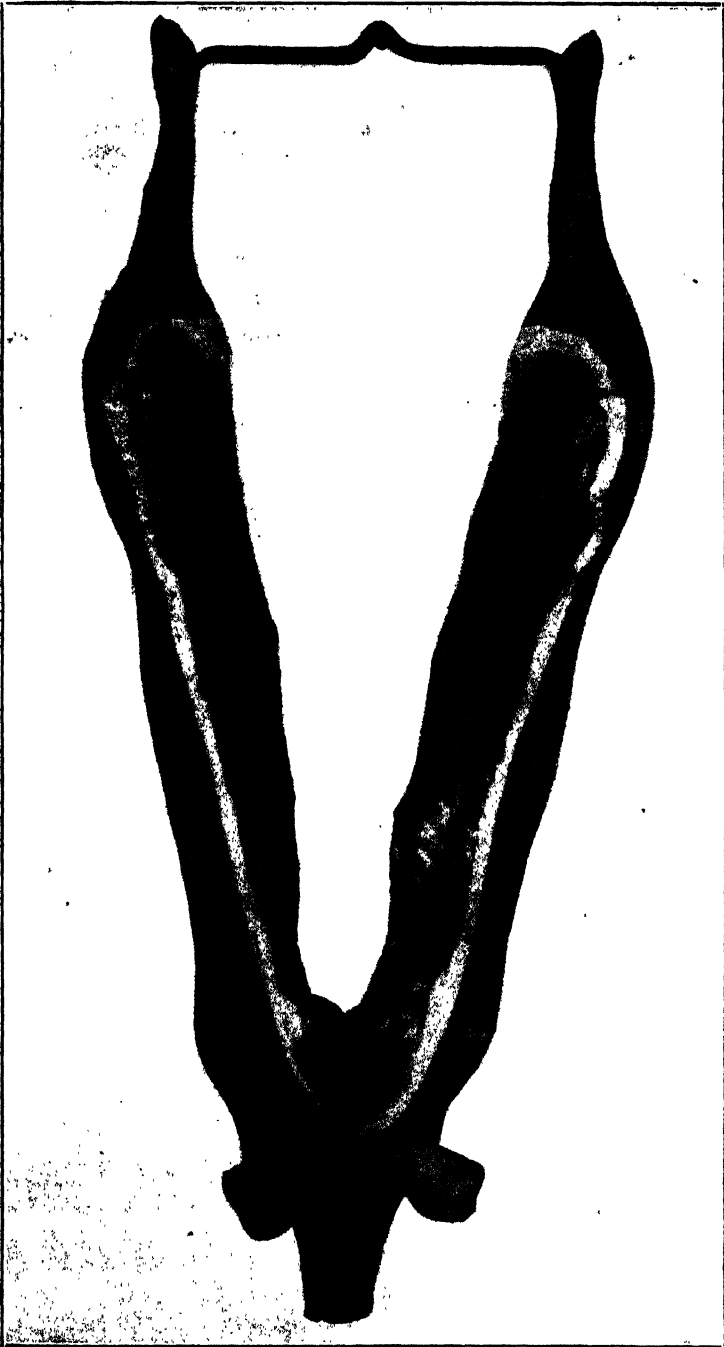


PLATE 44.

FIG. 4.—In striking contrast to Fig. 3 this prime quality fleshy bacon pig realised top market rates, and is in much demand throughout Australia. Note increased length of body, evenness throughout, and large proportion of lean to fat. There need be no fear of over-production of the correct type and weight in bacon pigs.

consists of bacon and ham, and 7 lb. of pork and lard. During the same year the same Australian consumes 158 lb. of beef and 68 lb. of mutton and lamb. The average Canadian consumes 87 lb. and the American 77 lb. of pork products each year in addition to other meats. This indicates that there are thousands of homes here that rarely serve pork products in their dining-rooms, and impresses upon those interested in pig production the possibilities ahead of the industry when Australians can be induced by improvement in quality of the products to consume more pork, bacon, ham, &c.

Quality dominates the position in any market, hence quality products should be the dominant factor with every individual farmer engaged in developing the industry, and with every unit engaged in manufacture and distribution. We must modernise our methods if we are to expand.

It is quite certain also that if the supply of suitable pigs to the various factories were more regular and of more reliable and suitable type better values would be obtained at all seasons of the year.

There is no reason why Australia should not be self-contained so far as the raising and consumption of its pig products are concerned.

Market Requirements Paramount.

The paramount consideration in the maturing of pigs is the market requirement. Pig raisers producing pigs of weights, quality and condition other than those especially required are losing money. From the table figuring out the market classification of pigs and factory values it will be noted that there are different grades, all of which vary both in age and in weight as well as in commercial value. **It certainly does pay to study market requirements and to be fully informed as to the correct age, weight, condition, and value.** There is more need to-day than at any previous stage in our history for a careful study of the requirements of the various markets, for competition is keen, market demands urgent, and the consumers more determined that they will only buy and pay for such goods as suit their own particular fancies. The consumers' demands must be catered for if the business is to become a profitable one. In the marketing of pork and bacon pigs there is no demand for very heavy, fat pigs of any description.

Boars or stags with long sharp tusks, rigs, ruptured stock, rough staggy pigs, cripples, aged and worn-out sorts, wild or bush pigs, thin, weak, rickety, damaged or diseased animals, or huge, over-fat, and very coarse pigs **are of no value at all, and should not be sent in or offered for sale. It does not pay to feed or handle such stock no matter how cheap they appear to be at auction or by private contract.**

Purchasers are only attracted by quality pigs of the most desirable type. **One prominent manufacturer recently remarked at a public gathering in Brisbane that 50 per cent. of the pigs coming forward to Queensland bacon factories were too fat and too heavy to realise top**

prices. In this direction producers must surely be at fault, and they cannot expect all-round top prices if so large a percentage of pigs are not of desired condition and weight. Further particulars in regard to prices, conditions of sale, &c., may be obtained on application to the managers of the various factories.

QUEENSLAND BACON FACTORIES.

| Name. | Factory at |
|---|--|
| Conaghan Bros. Ltd. | East street, Rockhampton. |
| Darling Downs Co-operative Bacon Company, Ltd. | Willowburn, via Toowoomba. |
| Foggit Jones Pty. Ltd. | Oxley, near Brisbane. |
| Huttons, J. C., Pty., Ltd. | Zillmere, near Brisbane. |
| North Queensland Co-operative Bacon Company, Ltd. | Floreat Siding, Mareeba, North Queensland. |
| Queensland Co-operative Bacon Association, Ltd. | Murarrie, near Brisbane. |
| Reeds, Ltd. | Ann street, Maryborough. |
| Warwick Bacon Company | Mill Hill, near Warwick. |

Marketing Pigs in Queensland.

This trade classification of the various grades of pigs has special reference to average age and weight in Queensland, and may be accepted as a reliable guide in the marketing of this class of stock.

TRADE CLASSIFICATION—QUEENSLAND PIGS.

| Name or Grade of Pig. | Approximate Age. | Approximate Weight. |
|-----------------------------|--------------------------------|--|
| Sucker or Sucking Pig | 6 weeks | 25 lb., live weight |
| Weaner | 8 weeks | 35 to 40 lb., live weight |
| Slip | 10 weeks | 45 lb., live weight |
| Store | 12 to 14 weeks | 55 to 65 lb., live weight |
| Light Porker | 4 months | 65 to 75 lb., live weight |
| Medium Porker | 4½ months | 85 to 95 lb., live weight |
| Heavy Porker | 5 to 5½ months | 115 to 135 lb., live weight |
| Light Baconer, Prime | 5 to 5½ months | 115 to 135 lb., live weight |
| Medium Baconer, Prime | 5½ to 6 months | 140 to 170 lb., live weight |
| Heavy Baconer, Prime | 6 to 6½ months | 170 to 175 lb., live weight |
| Heavy Baconer | Over 6 months | 175 to 185 lb., live weight |
| Heavy Baconer | Over 6 months | 185 to 197 lb., live weight |
| Heavy Baconer | Over 6 months | 197 to 216 lb., live weight |
| Backfatter | Up to 4 or 5 years | Up to 4 cwt., dressed weight |
| Stag | Up to 4 or 5 years | Various weights |
| Chopper | Up to 2 years or more | Up to 3 cwt., dressed weight, or heavier |
| Boars | Over, say, 4 to 6 months | These are unmarketable as meat pigs |

Values for these various grades of pigs vary considerably with age, quality, condition, weight, from around 12s. 6d. for a sucking pig up to

£3 10s. or more for prime quality baconers. For bacon pig values current in Queensland in February, 1929, see bacon factory buying charts featured hereunder.

*CO-OPERATIVE BACON FACTORIES BUYING CHART, QUEENSLAND, 4TH FEBRUARY, 1929.

NOTE.—Live weight column not included in this chart.

| Actual Dressed Weight. | Rate per lb. | Value per Pig.† | Actual Dressed Weight. | Rate per lb. | Value per Pig. |
|------------------------|--------------|-----------------------|------------------------|--------------|-----------------------|
| | <i>d.</i> | £ <i>s.</i> <i>d.</i> | | <i>d.</i> | £ <i>s.</i> <i>d.</i> |
| 86 lb. .. | 6 0 | 2 3 0 | 124 lb. .. | 6 77 | 3 10 0 |
| 87 lb. .. | 6 10 | 2 4 3 | 125 lb. .. | 6 72 | 3 10 0 |
| 88 lb. .. | 6 25 | 2 5 10 | 126 lb. .. | 6 57 | 3 9 0 |
| 89 lb. .. | 6 40 | 2 7 6 | 127 lb. .. | 6 47 | 3 8 6 |
| 90 lb. .. | 6 50 | 2 8 9 | 128 lb. .. | 6 37 | 3 8 0 |
| 91 lb. .. | 6 60 | 2 10 0 | 129 lb. .. | 6 27 | 3 7 6 |
| 92 lb. .. | 6 70 | 2 11 4 | 130 lb. .. | 6 18 | 3 7 0 |
| 93 lb. .. | 6 80 | 2 12 8 | 131 lb. .. | 6 09 | 3 6 6 |
| 94 lb. .. | 6 90 | 2 14 0 | 132 lb. .. | 6 0 | 3 6 0 |
| 95 lb. .. | 7 0 | 2 15 5 | 133 lb. .. | 5 90 | 3 5 6 |
| 96 lb. .. | .. | 2 16 0 | 134 lb. .. | 5 82 | 3 5 0 |
| 97 lb. .. | .. | 2 16 7 | 135 lb. .. | 5 74 | 3 4 6 |
| 98 lb. .. | .. | 2 17 2 | 136 lb. .. | 5 64 | 3 4 0 |
| 99 lb. .. | .. | 2 17 9 | 137 lb. .. | 5 51 | 3 3 0 |
| 100 lb. .. | .. | 2 18 4 | 138 lb. .. | 5 39 | 3 2 0 |
| 101 lb. .. | .. | 2 18 11 | 139 lb. .. | 5 26 | 3 1 0 |
| 102 lb. .. | .. | 2 19 6 | 140 lb. .. | 5 14 | 3 0 0 |
| 103 lb. .. | .. | 3 0 1 | 141 lb. .. | 5 01 | 2 19 0 |
| 104 lb. .. | .. | 3 0 8 | 142 lb. .. | 4 90 | 2 18 0 |
| 105 lb. .. | .. | 3 1 3 | 143 lb. .. | 4 78 | 2 17 0 |
| 106 lb. .. | .. | 3 1 10 | 144 lb. .. | 4 66 | 2 16 0 |
| 107 lb. .. | .. | 3 2 5 | 145 lb. .. | 4 55 | 2 15 0 |
| 108 lb. .. | .. | 3 3 0 | 146 lb. .. | 4 44 | 2 14 0 |
| 109 lb. .. | .. | 3 3 7 | 147 lb. .. | 4 32 | 2 13 3 |
| 110 lb. .. | .. | 3 4 2 | 148 lb. .. | 4 21 | 2 12 0 |
| 111 lb. .. | .. | 3 4 9 | 149 lb. .. | 4 10 | 2 11 0 |
| 112 lb. .. | .. | 3 5 4 | 150 lb. .. | 4 0 | 2 10 0 |
| 113 lb. .. | .. | 3 5 11 | 151 lb. .. | 3 89 | 2 9 0 |
| 114 lb. .. | .. | 3 6 6 | 152 lb. .. | 3 78 | 2 8 0 |
| 115 lb. .. | .. | 3 7 1 | 153 lb. .. | 3 68 | 2 7 0 |
| 116 lb. .. | .. | 3 7 8 | 154 lb. .. | 3 58 | 2 6 0 |
| 117 lb. .. | .. | 3 8 3 | 155 lb. .. | 3 48 | 2 5 0 |
| 118 lb. .. | .. | 3 8 10 | 156 lb. .. | 3 38 | 2 4 0 |
| 119 lb. .. | .. | 3 9 5 | 157 lb. .. | 3 28 | 2 3 0 |
| 120 lb. .. | .. | 3 10 0 | 158 lb. .. | 3 19 | 2 2 0 |
| 121 lb. .. | 6 94 | 3 10 0 | 159 lb. .. | 3 10 | 2 1 0 |
| 122 lb. .. | 6 88 | 3 10 0 | 160 lb. .. | 3 0 | 2 0 0 |
| 123 lb. .. | 6 82 | 3 10 0 | | | |

* Chart published by courtesy of the Queensland Co-operative Bacon Association, Limited, Murarrie, Q.

† These prices are for prime quality bacon pigs only, as delivered to the Queensland Co-operative Bacon Association Factory at Murarrie, Q., and are based on the actual dressed weight of the animal after the carcass has been allowed to cool off. Pigs other than prime are paid for on a weight and quality basis, at the discretion of the factory directorate.

* PROPRIETARY BACON FACTORIES, QUEENSLAND.

Schedule of Weights and Prices for Prime Quality Bacon Pigs, in operation
as at 4th February, 1929.

| Actual Live Weight. | Estimated Dressed Weight. | Rate per lb. | Value per Pig† | Actual Live Weight. | Estimated Dressed Weight. | Rate per lb. | Value per Pig† |
|---------------------------|---------------------------------|-----------------|----------------|---------------------------|---------------------------------|-----------------|----------------|
| | | <i>d.</i> | | | | <i>d.</i> | |
| 135 | 90 | 6.50 | 2 8 9 | 176 | 126 | 6.57 | 3 9 0 |
| 136 | 91 | 6.60 | 2 10 0 | 177 | 127 | 6.47 | 3 8 6 |
| 137 | 92 | 6.70 | 2 11 4 | 178 | 128 | 6.37 | 3 8 0 |
| 138 | 93 | 6.80 | 2 12 8 | 179 | 129 | 6.27 | 3 7 6 |
| 139 | 94 | 6.90 | 2 14 0 | 180 | 130 | 6.18 | 3 7 0 |
| 140 | 95 | 7.0 | 2 15 5 | 181 | 131 | 6.09 | 3 6 6 |
| 141 | 96 | .. | 2 16 0 | 182 | 132 | 6.0 | 3 6 0 |
| 142 | 97 | .. | 2 16 7 | 183 | 133 | 5.90 | 3 5 6 |
| 143 | 98 | .. | 2 17 2 | 184 | 134 | 5.82 | 3 5 0 |
| 144 | 99 | .. | 2 17 9 | 185 | 135 | 5.74 | 3 4 6 |
| 145 | 100 | .. | 2 18 4 | 186 | 136 | 5.64 | 3 4 0 |
| 146 | 101 | .. | 2 18 11 | 187 | 137 | 5.51 | 3 3 0 |
| 147 | 102 | .. | 2 19 6 | 188 | 138 | 5.39 | 3 2 0 |
| 148 | 103 | .. | 3 0 1 | 189 | 139 | 5.26 | 3 1 0 |
| 149 | 104 | .. | 3 0 8 | 190 | 139 | 5.26 | 3 1 0 |
| 150 | 105 | .. | 3 1 3 | 191 | 140 | 5.14 | 3 0 0 |
| 151 | 105 | .. | 3 1 3 | 192 | 141 | 5.01 | 2 19 0 |
| 152 | 106 | .. | 3 1 10 | 193 | 141 | 5.01 | 2 19 0 |
| 153 | 107 | .. | 3 2 5 | 194 | 142 | 4.90 | 2 18 0 |
| 154 | 108 | .. | 3 3 0 | 195 | 143 | 4.78 | 2 17 0 |
| 155 | 108 | .. | 3 3 0 | 196 | 144 | 4.66 | 2 16 0 |
| 156 | 109 | .. | 3 3 7 | 197 | 145 | 4.55 | 2 15 0 |
| 157 | 110 | .. | 3 4 2 | 198 | 146 | 4.44 | 2 14 0 |
| 158 | 110 | .. | 3 4 2 | 199 | 147 | 4.32 | 2 13 0 |
| 159 | 111 | .. | 3 4 9 | 200 | 148 | 4.21 | 2 12 0 |
| 160 | 112 | .. | 3 5 4 | 201 | 149 | 4.10 | 2 11 0 |
| 161 | 112 | .. | 3 5 4 | 202 | 150 | 4.0 | 2 10 0 |
| 162 | 113 | .. | 3 5 11 | 203 | 150 | 4.0 | 2 10 0 |
| 163 | 114 | .. | 3 6 6 | 204 | 151 | 3.89 | 2 9 0 |
| 164 | 115 | .. | 3 7 1 | 205 | 151 | 3.89 | 2 9 0 |
| 165 | 115 | .. | 3 7 1 | 206 | 152 | 3.78 | 2 8 0 |
| 166 | 116 | .. | 3 7 8 | 207 | 153 | 3.68 | 2 7 0 |
| 167 | 117 | .. | 3 8 3 | 208 | 154 | 3.58 | 2 6 0 |
| 168 | 118 | .. | 3 8 10 | 209 | 155 | 3.48 | 2 5 0 |
| 169 | 119 | .. | 3 9 5 | 210 | 155 | 3.48 | 2 5 0 |
| 170 | 120 | .. | 3 10 0 | 211 | 156 | 3.38 | 2 4 0 |
| 171 | 121 | 6.94 | 3 10 0 | 212 | 157 | 3.28 | 2 3 0 |
| 172 | 122 | 6.88 | 3 10 0 | 213 | 158 | 3.19 | 2 2 0 |
| 173 | 123 | 6.82 | 3 10 0 | 214 | 159 | 3.10 | 2 1 0 |
| 174 | 124 | 6.77 | 3 10 0 | 215 | 159 | 3.10 | 2 1 0 |
| 175 | 125 | 6.72 | 3 10 0 | 216 | 160 | 3.0 | 2 0 0 |

Smallgoods sows 2½d. to 3d. per lb. with 30 per cent. deduction.

* Chart published by courtesy of Stock Agents, Ltd., Brisbane, representing Proprietary Bacon Factories, Q.

† These prices are for prime quality bacon pigs only, as weighed by Proprietary Company's buyer at Country Railway Stations and Trucking Yards. Other pigs are paid for on a weight and quality basis at the discretion of the buyer and the company he represents.

The prices quoted above represent a fair general average value for prime quality bacon pigs within the weights stated on the charts at Queensland bacon factories. In actual practice there would be practically

no deductions from these values under the buying systems common in the Northern State. Rail freights, charges for loading and forwarding, &c., are invariably paid by the Queensland factories, and, as far as is possible, live stock are given preference in quick transport over the railways.

Southern market quotations for pork and bacon as published in the daily and weekly press are invariably subject to heavier deductions due to the different system of marketing. There, in numerous instances, the transport and selling charges approximate 10s. per head more than they do in this State, as per figures quoted above. It is important to bear this in mind when comparing published market reports, as otherwise Queensland prices might be thought to compare unfavourably with those ruling in the Southern States.

While it will be noted that values fluctuate a good deal, and while pigs of one grade might readily be included in another and perhaps better grade, it can be taken as a general rule that the principal demand is for the medium or prime weight animal, whether marketed as porkers or baconers or included in other grades. There is in the North particularly a very limited demand for very light porkers or very heavy, fat pigs. The prime pig in good marketable condition with a firm yet mellow flesh and firm white fat is the one that is most profitable in the meat trade.

Having regard to the general trend of prices it would appear that there is little hope of permanently higher values in Queensland while the human population is so limited. There is all the more reason therefore for the devoting, by the pig raiser, of special attention to the finer points of the business to ensure a remunerative return.

A Sum in Subtraction for the Pig Farmer.

By sale of—

| | £ | s. | d. |
|--|---|----|----|
| (a) One prime bacon pig, weight 120 lb., at 7d. per lb., dressed value | 3 | 10 | 0 |
| (b) One very heavy fat pig, weight 160 lb., at 3d. per lb., dressed value | 2 | 0 | 0 |
| Loss in cash through over-fattening (b) | 1 | 10 | 0 |
| Plus increased cost of feed, labour, freight, and risk involved in holding (b), say | 1 | 0 | 0 |
| Total loss incurred through over-fattening pig (b) by 40 lb. or more | 2 | 10 | 0 |

The point emphasised here is that a detailed knowledge of market weights and values is essential in the production of pigs for profit. Without such knowledge the business cannot prove profitable.

A Sum in Multiplication for the Pig Farmer.

By utilising the food, time, labour, risk, &c., used in producing the unprofitable pig (*b*) referred to above, showing a loss of more than 1s. per lb. of the surplus fat and weight—in topping up one bacon pig 86 lb. dressed weight, valued at 6d. per lb., £2 3s.—(and not in general demand at all the factories) to prime bacon weight 120 lb., and valued at £3 10s., a net profit (at no additional expense) of 10s. may be gained instead of the loss varying from £1 10s. to £2 10s. after allowing 17s. as the approximate cost of feeding.

Attention is again drawn to the statement made elsewhere to the effect that 50 per cent. of the pigs coming forward are unsuitable for the market. Big losses are being sustained by pig raisers in consequence.

Weighing the Pigs on the Farm.

The provision on the farm of a properly constructed platform scale and crate with which to weigh the pigs at regular intervals, and especially prior to marketing, is an essential to the success of the business, particularly now that condition and weight are such important items in pig marketing.

A suitable outfit may appear costly and beyond the means of the average farmer, but observation and experience prove its provision to be quite as necessary in the marketing of pigs as are the class of milk

To raise the consumption of pork products from 12 lb. to 20 lb. per capita in Australia (a very desirable objective) would mean the consumption of 500,000 additional pigs each year if the population stood still. Happily the population does not stand still, it increases at the rate of 200,000 per annum, and with consumption at 20 lb. per capita it would mean a further 40,000 pigs each year.

Who is to say this is not possible provided pig raisers enter whole-heartedly into an intensive advertising campaign to tell the consumer what an excellent and nutritious product they have to offer.

and cream cans recommended in the marketing of these dairy products; the bushel, half bushel, standard and other containers in the marketing of fruit; and the correct type of sacks in the marketing of cereals, &c.

Bacon factories do not purchase pigs now except on an actual weight (live or dressed) and condition basis; nor should the farmer guess the weight and lose money. It is only by having up-to-date equipment in stock, plant, and knowledge that maximum profits may be expected.

A comparison of the prices paid for pigs of the same quality and condition but of varying weights proves enlightening, and demonstrates the urgency of making every possible provision to satisfy the exacting requirements of the markets.

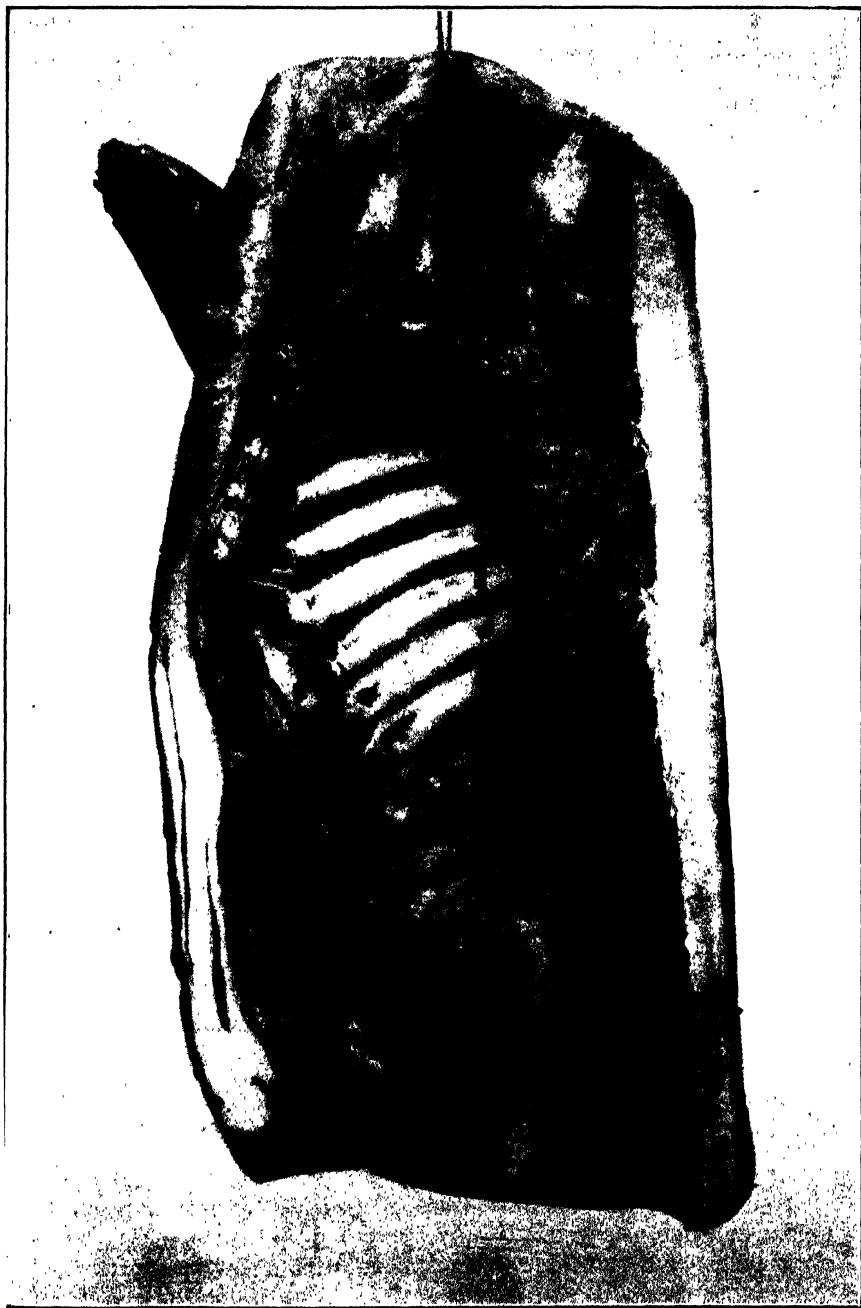


PLATE 45.

FIG. 5.—Heavy, over-fat fitch, much depreciated in value by its weight (36 lb.) and thickness of fat along back. Factories have difficulty in disposing of bacon of this description, even at a considerable discount. It does not pay them, nor is it a good business proposition to the farmer. Study the factory charts and compare prices for confirmation of statement.



PLATE 46.

FIG. 6.—Prime quality, deep-bodied fitch of bacon of good trade weight (27 lb.). Note evenness of fat along back and fleshiness of the fitch throughout. This was from a pig of desirable trade weight and condition. Desirable weight for fitches of bacon is from 24 to 27 lb. each.

Marketing Organisation.

As will be noted from the data in this pamphlet, there is much in the way of improvement which can be affected at the production end. Attention to marketing requirements by the individual pig raiser is the first step in effective marketing organisation. The helping hand of Departmental officers is available on request, and every assistance will be gladly and willingly rendered. Pig raisers in general should seek to attain the high standard already set by many progressive men engaged in the

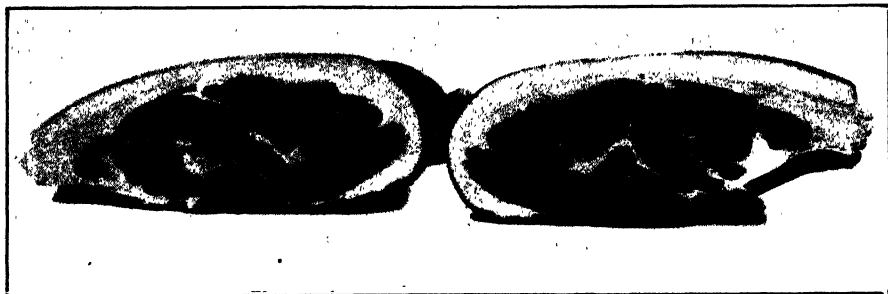


PLATE 47.

FIG. 7.—This ham, while of excellent quality, and with the fat evenly marbled through the lean, was too fat and too heavy for best trade requirements. Its weight, 18 lb., limited its sale to ham and beef shops, restaurants, &c. It does not pay to over-fatten pigs or to market them when over the desired factory weights. Popular factory weights for hams are from 12 to 14 lb. Hams 9 to 10 lb. in weight are not usually prime enough, while those over 14 lb. weight are in poor demand.

industry. Pig raisers on the one hand and bacon curing establishments on the other must realise that their interests are closely related and that they must work in unison in order to ensure the prosperity of the pig-raising industry.

Primary obstacles to improvement in the marketing sphere are as shown herein—first, the irregular supplies of pigs, and second, the large proportion of pigs marketed which are of unsuitable weights. With these obstacles removed by the concentrated effort of the individual pig raiser there will be good ground for closer collaboration by producing interests with the manufacturers in other directions.

An object lesson is to be found in the operations of the Northern Pig Board established in the year 1923 under the agricultural legislation introduced by the Queensland Government. As a result of organised co-operation pig prices in the Northern area are now on a par with those ruling in Southern Queensland, and a new industry has been created. During the year ended 30th June, 1928, the Northern Pig Board handled 9,626 pigs. The pigs produced are allocated as between the pork market and the bacon market, those most suitable for the latter trade being treated by the Co-operative Bacon Factory with which the Pig Pool Board is allied. The return to the Northern pig raiser is the average between the price realised for pork through the butchers within the area, and that available through the bacon market.

There are many directions in which the co-operative enterprise

exemplified in Northern Queensland may be emulated in the Southern part of the State, but the primary consideration at the moment concerns the organising of that part of the business which is within the sphere of the individual pig raiser himself.

Departmental Officers offer a Helping Hand.

It is with the object of assisting the farmer to become more efficient and to enable him to make more profit out of his pigs that Departmental officers have entered so vigorously into the instructional campaign among pig raisers. The Instructors have spared no effort to place themselves in direct touch with producers and at the same time to work in co-operation with all other branches of the trade. It is satisfactory to note the spirit of confidence thus engendered and to know that pig raisers are looking more and more to the Department of Agriculture and Stock for information and advice as to the best methods of procedure and as to future progress.

Agricultural Extension Services.

Through the medium of correspondence and personal interviews dealing with every phase of the industry and with the activities outlined above, the services of the Department are made available to farmers in every portion of the State. The "Queensland Agricultural Journal" and the city and country Press provide media through which valuable information is conveyed to the farming community. The aim is to provide every farmer with the most up-to-date information it is possible to secure. The Instructors in Pig Raising invite you to communicate with them regarding your problems, whether they have reference to the control of stock in health or in disease or on any other aspect of the business. **You are urged to avail yourself of their advice and assistance.**

Official Itineraries and Farm Visits.

The Instructors in Pig Raising travel extensively on itineraries during which personal visits are paid to farmers engaged in pig raising. That these visits are appreciated is clearly indicated by the kindly welcome extended to visiting officers, and by the many friendships formed with the farming community in every district visited.

Schools of Instruction.

The success of the initial Pig Farmers' School, held at the Queensland Agricultural High School and College, Gatton, in June, 1928, indicates the possibilities ahead of this form of instruction which appeals especially to those of the farming community who have recently left school and have taken their places on the farm; indeed, it appeals to senior farmers also, many of whom are only too pleased to have the opportunity thus afforded, of adding to their knowledge of the industry. **You are invited to write for particulars to the Principal, Queensland Agricultural High School and College, T.P.O. South, Gatton, Queensland.**

ENCOURAGEMENT OF JUNIOR AND ADULT FARMERS.**Boys' and Girls' Pig Clubs.**

Queensland leads the way in Australia in the development of the Boys' and Girls' Pig Club Scheme. Clubs have been organised and club contests arranged in many districts in the Southern and Central Divisions of the State, and, in due course, clubs will also be in operation in North Queensland. In the development of this scheme officers of the Department of Agriculture and Stock co-operate with officials of the Department of Public Instruction, and their efforts are backed up by enthusiastic club members, local committees, agricultural show societies,

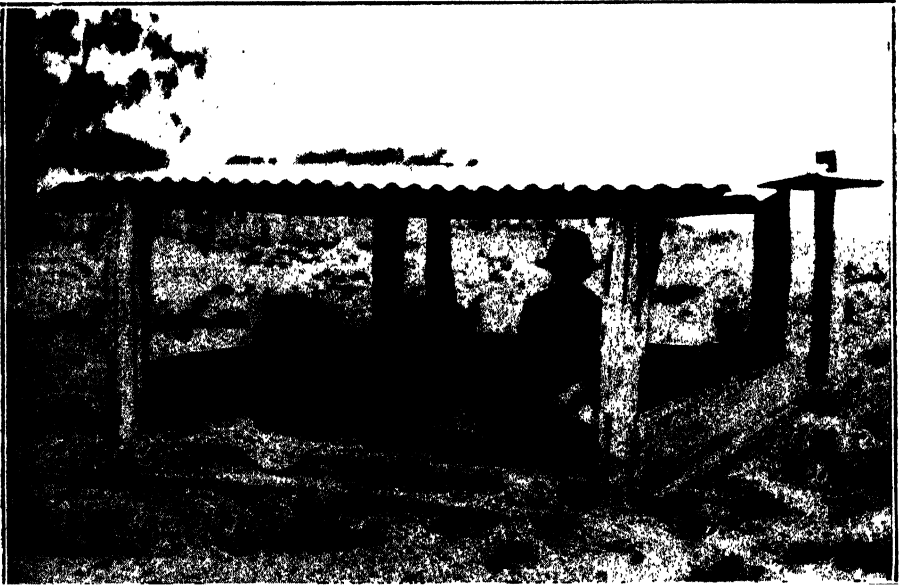


PLATE 48.

FIG. 8.—This junior farmer, whose pigs were penned in a Queensland Pig Club contest, did not have much to spend on pig sty accommodation, but as he promptly replied when asked a question about pig pens, "Well, I like my pig's pen to be roomy and comfortable, so that it is easily kept clean and is cool and airy even on a very hot day." The boy and his pigs certainly look contented, and in each case cool and comfortable.

&c., in the districts in which clubs function. The scheme has boundless possibilities, and from former successes it is evident in years to come that thousands of junior and senior farmers will be trained by the clubs, and will become more efficient farmers as a result of their association with this scheme of practical instruction. These clubs are intensely practical, the rules of membership requiring each club member to secure a suitable pig with which to enter the contest. Provision is made for porkers and baconers of the various grades as well as for stud pigs, and in general each club runs for a period of approximately four months. The scheme allows for visits of Instructors to the homes of the club members for the purpose of an official inspection and for club tours, picnics, contests, meetings, and other formal and informal gatherings.

Club members have been singularly successful in the preparation of porkers and baconers for market and have shown appreciable profits. Those possessing stud pigs have proved that they can compete on even terms in the show ring with farmers having a much wider knowledge of the preparation of stock for show and for sale. A scheme providing for Senior Clubs in which boys and girls who have already left school may enter will shortly be in operation. Write to the Department of Agriculture and Stock, Brisbane, for particulars.

PIG CLUBS FOR QUEENSLAND BOYS AND GIRLS.

If you are interested in the Pig Club Movement, we shall be glad of your co-operation, for it is desirable that clubs should be in operation in every portion of the State suited to this branch of agriculture. All information available at the Department of Agriculture and Stock, and the Department of Public Instruction, Brisbane.

General.

The educational propaganda also includes the broadcasting from Station 4QG, Brisbane, of radio talks, a modern avenue through which farmers and their families over a widespread area are reached with beneficial results. Copies of the lecturettes are available on application.

The Queensland Government Agricultural Bank services are at the disposal of settlers engaged in pig raising. Under specified conditions advances are made to cover purchase of stock, &c., repayment being arranged for over a series of years. Full particulars may be obtained from the Manager of the Agricultural Bank, Brisbane.

Suitable breeding stock are made available at very reasonable prices to the farming community from several Government institutions, including the Queensland Agricultural High School and College, Gatton; the Mental Hospitals at Goodna, Willowburn, and Sandy Gallop; the Farm Home for Boys, Westbrook; and the State Farm at Kairi on the Atherton Tableland.

At these studs the stock available are of the best type it is possible to secure, and they are bred along approved lines for high production and profit. Many private breeders are also engaged in the breeding and sale of stud pigs.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription—one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

WHEAT CROP COMPETITION—SEASON 1928.

REPORT OF THE DIRECTOR OF AGRICULTURE, MR. H. C. QUODLING.

Twenty-six crops were entered against fifty-one in last year's competition; fifteen and eleven entries being received from the Toowoomba and Warwick districts respectively. Six of last year's entrants competed again, including two prize winners, but the latter were unsuccessful on the present occasion. A 50 per cent. reduction in entries in such a short period may or may not have much significance, and might be attributable, in part, to a late pronouncement being made respecting the holding of the competition, and to the influence exercised generally on crops by the incidence of the dry weather. If the educational value of such competitions is to be the primary reason for holding them, good grounds exist for the earlier lodgment of entries immediately the planting season is concluded; otherwise, there is a likelihood of a repetition of crops being entered, as many were this year when actually ripe.

As success in any business undertaking is measured by the resultant £ s. d., it follows that the conditions laid down as a basis for a wheat crop competition should deal with fundamentals governing that success. Good cultivation and early and intelligently planned cropping arrangements come naturally within this category.

The opinion is expressed that if a competition is to be held in 1929, the earliest possible pronouncement respecting its conditions should be made, a small quota of the entrance fee might be lodged at time of nomination and the balance at a date to be decided upon.

In submitting the report at the conclusion of last year's competition and referring specifically to the points for "apparent yield," it was suggested at the time that one point might be allotted for each of the first twenty-four bushels and half a point for every subsequent bushel; however, it was decided by the promoters of this year's competition that half a point was to be awarded for every bushel, under this particular heading.

If an analysis of the results of this year's competition were made on the former mentioned basis, it would have had a marked effect on the present results. As far as your judges are concerned they still subscribe to the opinion that by allowing the general scale of points to remain as at present, and adopting last year's suggestion (one point for each bushel of the first twenty-four bushels and half a point for each additional bushel), it would have an effect in assisting to promote the growth of prolific commercial varieties under conditions calculated to encourage the production of wheat on a sound basis.

Another matter having a bearing on future crop competitions was the suggestion made on behalf of growers who cultivate large areas of wheat that two competitions should be run, one for 20 acres as at present and another for 100-acre fields. Our opinion is that large scale operations are deserving of every possible support.

Turning again to this year's competition it will be noted from the schedule of points awarded when judging was carried out, that high yields were anticipated. This fact clearly indicates how important it is for growers seeking greater stability and success in their business to adopt early and thorough methods of cultivation, as these were found to invariably synchronise with high yields. Close observation clearly showed also that capacity to yield was undoubtedly dependent upon the wheat in the early prepared fields having reserve supplies of sub-soil moisture to draw upon during several weeks of dry weather in August and September. Where this moisture was unavailable on late prepared and late sown fields, crop yields suffered accordingly.



PLATE 49.—BENDING LOW WITH ITS WEIGHT OF GRAIN.

With this Crop of "Pusa," Mr. W. Sprott, of Pilton, won the 1st and Champion Prizes in the Competition, also first place in the Southern Downs Division



PLATE 50.—MR. J. PAULI'S CROP OF "CLARENDON," AT BACK PLAINS, CLIFTON, WAS FIRST IN THE EASTERN DOWNS DIVISION

The Director of Agriculture, Mr. H. C. Quodling, is the figure in the foreground

"Of the world's great work he has done his share
Who has garnered a crop of wheat."



PLATE 51.—MR. E. C. KREIG'S EXCELLENT CROP OF THE "DUKE OF YORK" VARIETY, AT BROOKSTEAD, WAS AWARDED SECOND PLACE IN THE EASTERN DOWNS DIVISION.

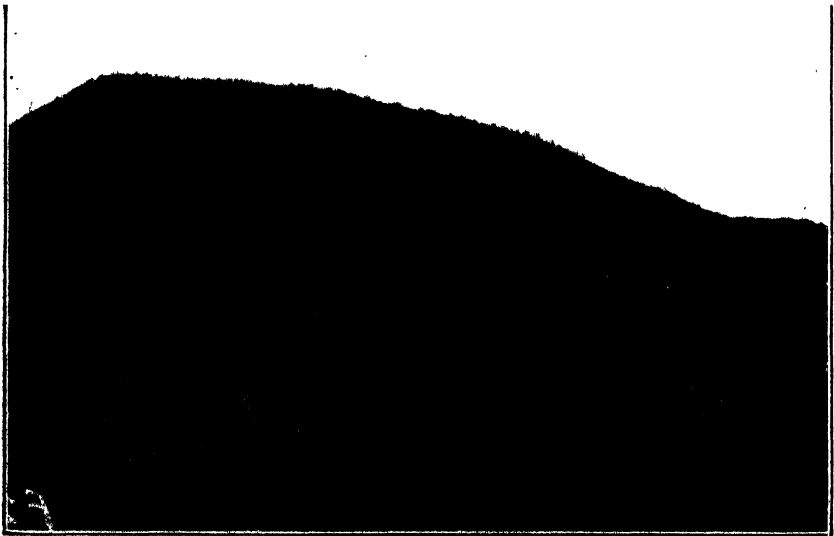


PLATE 52.—THIS CROP OF "WATCHMAN," GROWN BY MR. R. S. YOUNG ON HIS FARM AT UPPER FREESTONE, WAS AWARDED SECOND PLACE IN THE SOUTHERN DOWNS DIVISION.

"A field of gold, shadowed by green wooded hills."



PLATE 53.—MESSRS. J. H. and R. M. ANDERSON'S CROP OF "PUSA," AT SOUTHBROOK, DARLING DOWNS, GAINED THIRD PLACE IN THE EASTERN DOWNS DIVISION.

" . . . After all the toll and heat,
He's paid in more than silver who has grown one field of wheat."



PLATE 54.—MR. F. J. ARMSTRONG'S CROP OF "PUSA," ON HIS FARM AT PILTON. WAS GIVEN THIRD PRIZE FOR THE SOUTHERN DOWNS DIVISION.

"Green and amber and gold it grows
When the sun sinks late in the West."

WHEAT CROP COMPETITION, 1928—SOUTHERN DOWNS DIVISION.
EASTERN DOWNS HORTICULTURAL AND AGRICULTURAL ASSOCIATION, WARWICK.

| Name of Competitor. | Variety. | Apparent Yield. | POINTS AWARDED. | | | | | | | Place in Competition. |
|---|---------------|-----------------|---------------------|-----------------------|-------------------|------------|--------------|-----------------------|-------|-----------------------|
| | | | Apparent Yield. | Freedom from Disease. | Evenness of Crop. | Condition. | Cleanliness. | Total Points Awarded. | | |
| | | | | | | | | | | |
| | | Bus. | Half point per Bus. | Max. 20. | Max. 30. | Max. 20. | Max. 10. | Max. 20. | | |
| W. Sprott, Pilkon | Pusa .. | 46 | 23 | 17-0 | 27-5 | 17-5 | 9-0 | 18-0 | 112-0 | 1 |
| R. S. Young, Upper Freestone .. | Watchman .. | 38 | 19 | 19-0 | 28-0 | 18-0 | 7-0 | 17-0 | 108-0 | 2 |
| F. J. Armstrong, Pilkon | Pusa .. | 42 | 21 | 17-0 | 28-0 | 16-0 | 8-0 | 17-0 | 107-0 | 3 |
| C. W. Free, Headington Hill, Clifton .. | Pusa .. | 40 | 20 | 17-0 | 28-0 | 17-0 | 8-0 | 16-0 | 106-0 | 4 |
| Robt. Reed, Willowvale, Warwick .. | Novo .. | 40 | 20 | 17-5 | 27-5 | 17-0 | 7-0 | 16-5 | 105-5 | 5 |
| Christensen Bros., Freestone | Three Seas .. | 40 | 20 | 16-0 | 28-0 | 17-5 | 8-0 | 15-0 | 104-5 | 6 |
| M. S. Kelly, Junabee | Florence .. | 36 | 18 | 14-0 | 29-0 | 17-0 | 8-0 | 16-5 | 102-5 | 7 |
| C. W. Free, Headington Hill, Clifton .. | Clarendon .. | 34 | 17 | 17-0 | 28-5 | 16-0 | 7-5 | 16-0 | 102-0 | 8 |
| W. P. Canning, Yangan | Waratah .. | 36 | 18 | 17-0 | 26-0 | 17-0 | 7-5 | 16-0 | 101-5 | 9 |
| W. Crichton, Mount Juliet, Warwick .. | Ghuyas .. | 38 | 19 | 16-0 | 27-5 | 15-5 | 7-5 | 15-0 | 100-5 | 10 |
| W. Tucker, Willowvale | Clarendon .. | 40 | 20 | 14-5 | 27-0 | 16-0 | 7-0 | 14-0 | 98-5 | 11 |
| C. Nielsen, Yangan | Novo .. | 36 | 18 | 14-0 | 25-5 | 17-0 | 5-0 | 12-0 | 91-5 | 12 |

WHEAT CROP COMPETITION, 1928—EASTERN DOWNS DIVISION.
ROYAL AGRICULTURAL SOCIETY, TOOWOOMBA.

| Name of Competitor. | Variety. | POINTS AWARDED. | | | | | | | | | | Total Points Awarded. | Place in Competition. |
|--|----------|-----------------|---------------------|------------------------------|----------------------|-------------------|------------|--------------|----------|----------|----------|-----------------------|-----------------------|
| | | Apparent Yield. | | Treeness to Type and Purity. | Freedom from Disease | Evenness of Crop. | Condition. | Cleanliness. | | | | | |
| | | Bus. | Half point per Bus. | | | | | | Max. 20. | Max. 30. | Max. 20. | | |
| J. J. Pauli, Clifton | | 36 | 18.0 | 16.5 | 29.0 | 19.0 | 8.5 | 19.0 | 110.0 | 1 | | | |
| E. C. Kreig, Brookstead | | 34 | 17.0 | 20.0 | 29.0 | 17.0 | 8.0 | 18.0 | 109.0 | 2 | | | |
| J. J. H. and R. M. Anderson, Southbrook | | 38 | 19.0 | 17.0 | 27.0 | 18.0 | 8.0 | 18.0 | 107.0 | 3 | | | |
| J. J. Ritson and Sons, Clifton | | 39 | 19.5 | 16.5 | 28.0 | 17.0 | 7.0 | 17.0 | 105.0 | 4 | | | |
| W. McLellan, junr., Nobby | | 36 | 18.0 | 15.5 | 26.0 | 17.0 | 8.0 | 18.0 | 102.5 | 5 | | | |
| J. J. W. Joppich, North Branch, Pittsworth | | 33 | 16.5 | 15.5 | 26.0 | 18.0 | 7.0 | 18.0 | 101.0 | 6 | | | |
| J. J. Ritson and Sons, Clifton (2) | | 32 | 16.0 | 17.0 | 26.0 | 17.0 | 7.5 | 17.0 | 100.5 | 7 | | | |
| Ziesemer Bros., Bongeen | | 25 | 12.5 | 17.0 | 27.0 | 17.5 | 7.0 | 19.0 | 100.0 | 8 | | | |
| J. J. Ritson and Sons, Clifton (1) | | 32 | 16.0 | 16.0 | 28.0 | 16.0 | 8.0 | 17.5 | 100.0 | 8 | | | |
| Ziesemer Bros., Bongeen | | 30 | 15.0 | 18.0 | 22.0 | 17.5 | 7.5 | 19.0 | 99.0 | 9 | | | |
| J. J. Flegler, junr., Irongate, Pittsworth | | 22 | 11.0 | 17.5 | 28.0 | 17.0 | 7.0 | 18.0 | 98.5 | 10 | | | |
| A. F. Gilkeson, Kingthorpe | | 27 | 13.5 | 16.5 | 27.5 | 16.0 | 7.0 | 18.0 | 98.5 | 10 | | | |
| G. J. Will, Kinkora, Pittsworth | | 27 | 13.5 | 15.0 | 27.5 | 15.5 | 7.5 | 17.5 | 96.5 | 11 | | | |
| G. J. Will, Kinkora, Pittsworth | | 30 | 15.0 | 14.5 | 26.0 | 15.5 | 6.5 | 18.0 | 95.5 | 12 | | | |



PLATE 55.—MR ROBERT REED'S FIELD OF "NOVO" WHEAT ON HIS FARM AT WILLOWVALE, DARLING DOWNS.

"Realisin' he was wealthy in whint makes a life worth while."

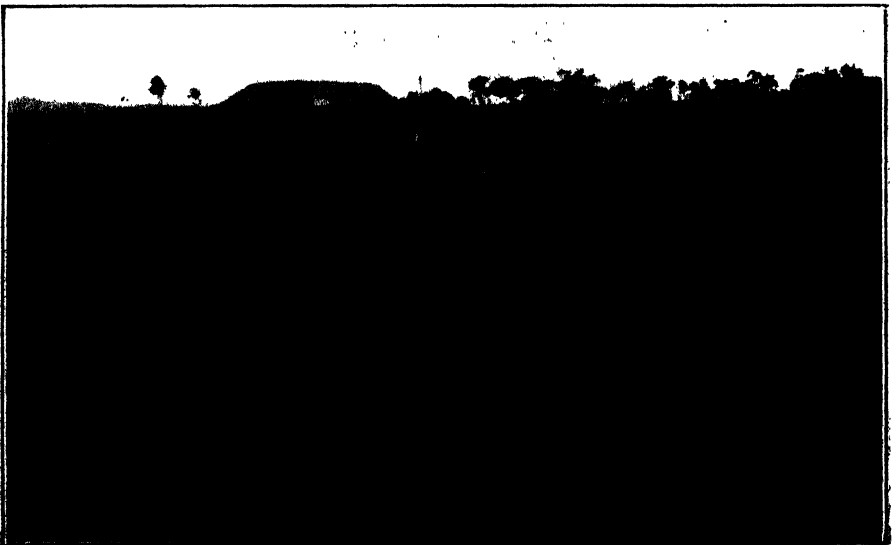


PLATE 56.—A FINE CROP OF "THREE SEAS" WHEAT ON MESSRS. CHRISTENSEN BROS. FARM, FREESTONE, DARLING DOWNS.

"When the settin' sun is gettin' low above the western hills,
When the creepin' shadows deepen, and a peace the whole world fills."

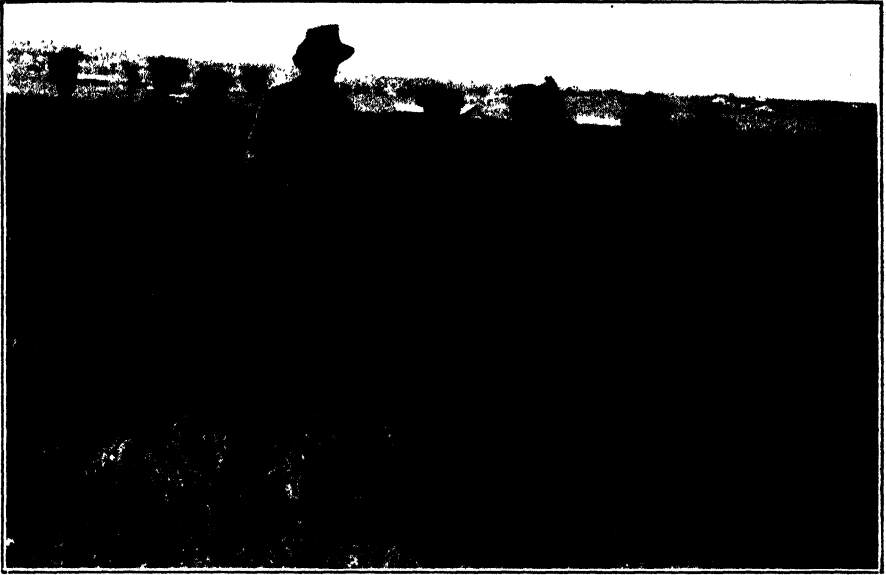


PLATE 57.—“WARATAH” WHEAT ON MR. W. P. CANNING’S FARM, YANGAN,
DARLING DOWNS.

“Wheat, Wheat, Wheat! When it comes my turn to meet
Death the Reaper, an’ the Keeper of the Judgment Book I greet,
Then I’ll face ‘em sort o’ calmer with the solace of the farmer
That he’s fed a million brothers with his Wheat, Wheat, Wheat.”



PLATE 58.—MR. J. JOFFICH’S FINE CROP OF “CURRAWA,” ON ROSENEATH FARM,
NORTH BRANCH, PITTSWORTH, DARLING DOWNS.

“Mountain or river or shining star,
There’s never a sight can beat—
Away to the skyline stretching far—
A sea of the ripening wheat.”

WHEAT CROP COMPETITION, 1928.
SHOWING POSITION IN ORDER OF MERIT OF COMPETITORS FROM WARWICK AND TOOWOOMBA DISTRICTS.

| Name of Competitor. | Variety. | District Competition. | Apparent Yield. | Apparent Yield. | Trieness to Type and Purity. | Freedom from Disease. | Evenness of Crop. | Condition. | Cleanliness. | Total Points Awarded. | Place in Competition. |
|--|-----------------|-----------------------|-----------------|---------------------|------------------------------|-----------------------|-------------------|------------|--------------|-----------------------|-----------------------|
| | | | Bus. | Haif-point per Bus. | 20 | 30 | 20 | 10 | 20 | | |
| W. Sproett, Pilton .. | Pusa .. | Warwick .. | 46 | 23.0 | 17.0 | 27.5 | 17.5 | 9.0 | 18.0 | 112.0 | *1 |
| J. Pauli, Clifton .. | Clarendon .. | Toowoomba .. | 36 | 18.0 | 16.5 | 29.0 | 19.0 | 8.5 | 19.0 | 110.0 | 2 |
| E. C. Kreig, Brookstead .. | Luke of York .. | Toowoomba .. | 34 | 17.0 | 20.0 | 29.0 | 17.0 | 8.0 | 18.0 | 109.0 | 3 |
| R. S. Young, Upper Freestone .. | Watchman .. | Warwick .. | 38 | 19.0 | 19.0 | 28.0 | 18.0 | 7.0 | 17.0 | 108.0 | 4 |
| J. H. and R. M. Anderson, Southbrook .. | Pusa .. | Toowoomba .. | 38 | 19.0 | 17.0 | 27.0 | 18.0 | 8.0 | 18.0 | 107.0 | 5 |
| F. J. Armstrong, Pilton .. | Pusa .. | Warwick .. | 42 | 21.0 | 17.0 | 28.0 | 16.0 | 8.0 | 17.0 | 107.0 | 5 |
| C. W. Free, Headington Hill, Clifton .. | Pusa .. | Warwick .. | 40 | 20.0 | 17.0 | 28.0 | 17.0 | 8.0 | 16.0 | 106.0 | 6 |
| Robt. Reed, Willowvale, Warwick .. | Novo .. | Warwick .. | 40 | 20.0 | 17.5 | 27.5 | 17.0 | 7.0 | 16.5 | 105.5 | 7 |
| J. Ritten and Sons, Clifton .. | Pusa .. | Toowoomba .. | 39 | 19.5 | 16.5 | 28.0 | 17.0 | 7.0 | 17.0 | 105.0 | 8 |
| Christensen Bros., Freestone .. | Three Seas .. | Warwick .. | 40 | 20.0 | 16.0 | 28.0 | 17.5 | 8.0 | 15.0 | 104.5 | 9 |
| M. E. Kelly, Junaboe .. | Florence .. | Warwick .. | 36 | 18.0 | 14.0 | 29.0 | 17.0 | 8.0 | 16.5 | 102.5 | 10 |
| W. McLellan, junr., Nobby .. | Warren .. | Toowoomba .. | 36 | 18.0 | 15.5 | 26.0 | 16.0 | 8.0 | 18.0 | 102.5 | 10 |
| C. W. Free, Headington Hill, Clifton .. | Clarendon .. | Warwick .. | 34 | 17.0 | 17.0 | 28.5 | 16.0 | 7.5 | 16.0 | 102.0 | 11 |
| W. P. Canning, Yangan .. | Waratah .. | Warwick .. | 36 | 18.0 | 17.0 | 26.0 | 17.0 | 7.5 | 16.0 | 101.5 | 12 |
| J. W. Joppich, North Branch, Pittsworth .. | Currawa .. | Toowoomba .. | 33 | 16.5 | 15.5 | 26.0 | 18.0 | 7.0 | 18.0 | 101.0 | 13 |
| W. Orclinton, Mount Juliet, Warwick .. | Gluyas .. | Warwick .. | 38 | 19.0 | 16.0 | 27.5 | 15.5 | 7.5 | 15.0 | 100.5 | 14 |
| J. Ritten and Sons, Clifton (2) .. | Florence .. | Toowoomba .. | 32 | 16.0 | 17.0 | 26.0 | 17.0 | 7.5 | 17.0 | 100.5 | 14 |
| Ziesemer Bros., Bongeen .. | Florence .. | Toowoomba .. | 25 | 12.5 | 17.0 | 27.0 | 17.5 | 7.0 | 19.0 | 100.0 | 15 |
| J. Ritten and Sons, Clifton (1) .. | Florence .. | Toowoomba .. | 32 | 16.0 | 16.0 | 28.0 | 16.0 | 8.0 | 17.5 | 100.0 | 15 |
| Ziesemer Bros., Bongeen .. | Pusa .. | Toowoomba .. | 30 | 15.0 | 18.0 | 22.0 | 17.5 | 7.5 | 19.0 | 99.0 | 16 |
| J. Flegler, junr., Irongate, Pittsworth .. | Florence .. | Toowoomba .. | 22 | 11.0 | 17.5 | 28.0 | 17.0 | 7.0 | 18.0 | 98.5 | 17 |
| W. Tucker, Willowvale .. | Clarendon .. | Warwick .. | 40 | 20.0 | 14.5 | 27.0 | 16.0 | 7.0 | 14.0 | 98.5 | 17 |
| A. F. Gillesken, Kingsthorpe .. | Clarendon .. | Toowoomba .. | 27 | 13.5 | 16.5 | 27.5 | 16.0 | 7.0 | 18.0 | 98.5 | 17 |
| G. J. Will, Kinkora, Pittsworth .. | Clarendon .. | Toowoomba .. | 27 | 13.5 | 15.0 | 27.5 | 15.5 | 7.5 | 17.5 | 96.5 | 18 |
| G. J. Will, Kinkora, Pittsworth .. | Currawa .. | Toowoomba .. | 30 | 15.0 | 14.5 | 26.0 | 16.5 | 6.5 | 18.0 | 95.5 | 19 |
| C. Nielsen, Yangan .. | Novo .. | Warwick .. | 36 | 18.0 | 14.0 | 25.5 | 17.0 | 5.0 | 12.0 | 91.5 | 20 |

* First and Champion.



PLATE 59.—MESSRS. ZIESEMER BROS. FIELD OF "FLORENCE," AT BONGEES DARLING DOWNS.

"And the breeze sweeps o'er the rippling rows,
Where the quail and skylark nest."



PLATE 60.—MR. G. J. WILL'S FINE CROP OF "CURRAWA" WHEAT AT KINKORA, DARLING DOWNS.

" . . . with a feelin' like content,
An' I feel like thankin' Heaven for a day in labour spent."

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING DECEMBER, 1928 AND 1927, FOR COMPARISON.

| Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | | Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | |
|-------------------------|-------------------|------------------------|-----------------|-------------|----------------------------------|-------------------|------------------------|-----------------|-------------|
| | Dec. | No. of Years' Records. | Dec., 1928. | Dec., 1927. | | Dec. | No. of Years' Records. | Dec., 1928. | Dec., 1927. |
| <i>North Coast.</i> | In. | | In. | In. | <i>South Coast—continued:</i> | In. | | In. | In. |
| Atherton ... | 7.77 | 27 | 6.50 | 7.76 | Nambour ... | 6.92 | 32 | 5.04 | 11.82 |
| Cairns ... | 8.79 | 46 | 3.75 | 3.38 | Nanango ... | 3.84 | 46 | 4.90 | 4.49 |
| Cardwell ... | 8.35 | 56 | 3.83 | 11.16 | Rockhampton ... | 4.82 | 41 | 4.36 | 9.14 |
| Cooktown ... | 6.96 | 52 | 2.07 | 6.68 | Woodford ... | 5.76 | 41 | 2.79 | 10.46 |
| Herberton ... | 5.70 | 41 | 6.58 | 4.94 | | | | | |
| Ingham ... | 6.94 | 35 | 8.78 | 6.00 | <i>Darling Downs.</i> | | | | |
| Innisfail ... | 11.87 | 47 | 10.34 | 14.58 | Dalby ... | 3.22 | 58 | 3.09 | 2.94 |
| Mossman ... | 11.97 | 15 | 4.29 | 9.40 | Emu Vale ... | 3.54 | 32 | 5.24 | 3.60 |
| Townsville ... | 5.61 | 57 | 3.76 | 8.50 | Jimbour ... | 3.20 | 40 | 4.28 | 3.65 |
| <i>Central Coast.</i> | | | | | Miles ... | 2.97 | 43 | 2.28 | 5.09 |
| Ayr ... | 3.97 | 41 | 4.13 | 9.63 | Stanthorpe ... | 3.52 | 55 | 4.94 | 2.71 |
| Bowen ... | 4.51 | 57 | 2.10 | 8.86 | Toowoomba ... | 4.35 | 56 | 5.91 | 5.92 |
| Charlton Towers ... | 3.54 | 46 | 3.82 | 3.94 | Warwick ... | 3.45 | 63 | 2.74 | 2.62 |
| Mackay ... | 7.35 | 57 | 10.10 | 35.82 | | | | | |
| Proserpine ... | 8.31 | 25 | 10.10 | 11.75 | <i>Maranoa.</i> | | | | |
| St. Lawrence ... | 4.73 | 57 | 7.90 | 15.51 | Roma ... | 2.51 | 54 | 1.53 | 3.45 |
| <i>South Coast.</i> | | | | | | | | | |
| Biggenden ... | 4.80 | 29 | 2.81 | 3.95 | <i>State Farms, &c.</i> | | | | |
| Bundaberg ... | 5.04 | 45 | 1.19 | 6.84 | Bungewongorai ... | 3.05 | 14 | 0 | 3.41 |
| Brisbane ... | 4.94 | 77 | 2.56 | 5.58 | Gatton College ... | 3.64 | 29 | 0 | 7.28 |
| Caboolture ... | 5.27 | 41 | 3.88 | 7.19 | Gindie ... | 3.04 | 29 | 2.58 | 7.41 |
| Childers ... | 5.82 | 33 | 4.29 | 4.39 | Hermitage ... | 3.03 | 22 | 0 | 3.41 |
| Crohamhurst ... | 7.20 | 35 | 4.24 | 13.51 | Kairi ... | 6.93 | 14 | 3.29 | 3.57 |
| Esk ... | 4.58 | 41 | 9.64 | 7.96 | Sugar Experiment Station, Mackay | 8.93 | 31 | 8.65 | 36.59 |
| Gayndah ... | 4.18 | 57 | 3.28 | 6.42 | Warren ... | 3.84 | 14 | 0 | 6.18 |
| Gympie ... | 6.14 | 58 | 4.01 | 9.17 | | | | | |
| Kilkivan ... | 4.63 | 49 | 2.71 | 6.57 | | | | | |
| Maryborough ... | 4.76 | 56 | 5.10 | 3.84 | | | | | |

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for December this year, and for the same period of 1927, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Meteorologist.

SEED POTATOES.

The careful selection of a suitable class of seed potatoes is necessary where potatoes are grown commercially. The utilisation of an even type of seed as regards sprouting size and shape means a regular and even germination, and as like begets like it is to be expected (all conditions being favourable) that the resultant crop will also be even in character. Seed should be selected carefully. Whole seed of two ounces size is to be at all times preferred. Tubers should be free of all signs of disease, regular in shape and size, and should be well sprouted or "shot" before the planting period eventuates. In this connection sprouts should be hardened by exposure to light and should not exceed $\frac{1}{4}$ of an inch in length. Sprouts in excess of this length are apt to be damaged in handling during the process of planting.

Where disease such as scab is suspected the usual formalin treatment prior to planting is to be recommended, using 1 pint of 40 per cent. formalin to 20 gallons of water and immersing therein tubers and bags for 1½ hours. Allow the tubers to dry under shade before planting. A slight discoloration of the sprouts if very tender may take place as the result of their coming in contact with the formalin solution, but the setback so obtained will be more than counterbalanced by the subsequent clean growth of the resultant plants.—A. E. GIBSON, Senior Instructor in Agriculture.

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Miss Gladys Moncrieff.—"Heenzo is a blessing to those who suffer from chest and throat ailments."

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Croup, Bronchitis, & Whooping Cough**

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FENCING WIRE
BARBED WIRE

As supplied to the Queensland Government

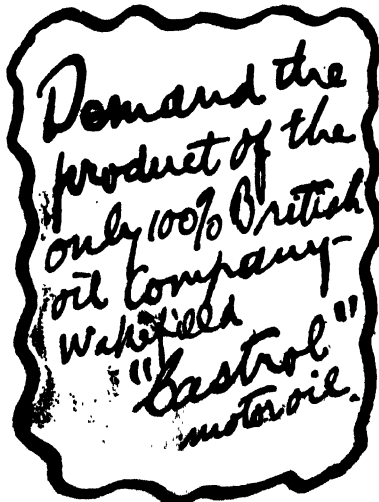
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FARM TRACTORS.

PLACE OF THE VALVES IN THE CYCLE OF OPERATIONS.

By E. T. BROWN.*

As suggested in a previous article the timing of the valves is decided by the maker of the engine. He is guided by various factors, such as the size of the valve opening, the compression ratio of the engine, its horse-power, and the engine speed. It is, however, better that the tractor operator should understand exactly when the valves are caused to open and shut, so that after dismantling he may be in a position to retime the engine if necessary. Here it might be remarked that whenever the engine is taken down the timing wheels working from the engine crankshaft should be marked so that they may be returned in exactly the same position. It is not commonly realised, but a tractor engine is a very wasteful machine. Not more than about one-fifth of the energy stored in the fuel is available for actual work. It is, however, one of the least wasteful of all the prime movers. In tractor engine construction it is essential to make a number of compromises. For instance, heat implies power, but it is necessary to sacrifice a certain amount of heat—dissipated by means of the cooling water—owing to the fact that the metal employed for cylinder construction is a conductor of heat. Philling cooling, the pistons would “seize” in the cylinders owing to excessive expansion. A second case in point is valve timing. It is found necessary to make serious sacrifices to secure the most possible power.

Timing the Inlet Valve.

When discussing the cycle of operations of a tractor engine it is usual to say that the inlet valve opens when the piston is at the top of its compression stroke and that it closes at the bottom of the inlet stroke. This is almost correct in the case of a very low-speed engine; it is not practicable with a comparatively high-speed engine like that used for a tractor. The mixture of air and fuel vapour is carried from the carburettor to the combustion chamber by the induction pipe. The fuel vapour is only held in very unwilling suspension. If the induction pipe be too large, which implies a slower movement of the mixture, the fuel vapour tends to liquefy. It is only possible to have valves of a certain size, the size being governed by the cylinder bore. The normal speed of a tractor engine is about 1,000 revolutions a minute. With the largest induction pipe and valve in use it is impossible for the mixture to enter the combustion chamber as rapidly as the piston descends on its induction stroke. This means that if the inlet valve were to open exactly at “top dead centre” and close at “bottom dead centre” only a partial charge would enter. The power of the firing stroke depends upon the quantity of firing mixture in the chamber. To give the incoming charge an opportunity of entering the combustion chamber it is necessary to keep the inlet valve open for some time after the piston has passed “bottom dead centre.” In the majority of tractor engines the inlet valve is timed to close about 30 degrees late—that is, when the piston has travelled one-sixth of its compression stroke. Even so, the combustion chamber is not completely charged, but it contains more mixture than if the inlet valve had closed at “bottom dead centre.” Incidentally it may be mentioned that this valve does not open until about 10 degrees after “top dead centre” has been reached. The reason for this is explained later.

The Exhaust Valve.

Exactly the same state of affairs is found with the exhaust valve. The piston rises on its exhaust stroke at such a high speed that it is impossible for it to drive out the exhaust gases. These would be compressed to such an extent were the exhaust valve only to open at “bottom dead centre” that the speed of the engine would be materially reduced and efficiency would be lost. When the piston is three-quarters of the way through its firing stroke the contents of the combustion chamber registers a pressure of between 40 lb. and 50 lb. to the square inch. If the exhaust valve be opened at this time the pressure assists the expulsion of the inert gases, while more time is also allowed. Hence there is not the same degree of back pressure on the piston head. The exhaust valve, too, is closed from 5 degrees to 10 degrees past top dead centre, so that the combustion chamber may be entirely emptied of its contents. This is the reason for the late opening of the inlet valve. The latter opens at the moment the exhaust valve closes.

Timing the Valves.

When retiming the engine the marks on the flywheel should be noted. These marks show the exact position of the piston in No. 1 cylinder—that is, the cylinder nearest the radiator. All that is necessary is to see that the flywheel is in the correct position for the opening of the inlet valve when the camshaft should be rotated until the inlet valve in this cylinder is just on the point of being raised. If the exhaust

* In the “Farmer and Settler.”

cams be on a separate camshaft the flywheel should be put in that position, which denotes the opening point of the exhaust valve when the camshaft may be set correctly.

Careful Attention to Minor Details.

Unless the sparking plugs be kept in good order it is immaterial whether the magneto be working efficiently and the wiring be all that is desirable; it is impossible to secure a good "fat" spark to explode or fire the mixture of air and fuel vapour. The plugs must be kept clean and the gap between the points must be correctly set. The lubricating oil, which works up from the base into the combustion chamber, tends to coat the points of the plugs with carbon, and in course of time the deposit becomes so great that the gap is completely bridged. This means that the current, instead of forming a spark, simply passes over the carbon bridge without exploding the mixture. From time to time the plugs should be taken out and the carbon deposit removed. If the plugs be of the detachable type—that is, can be taken to pieces—this is a simple enough task. If they be made in one piece, the points may be scraped with a blunt knife, or if they be very dirty they may be boiled in a strong soda solution. Another method of cleaning is to turn the plug upside down, fill the body with petrol, and set fire to it. This burns the deposit away rapidly. When the plugs have been cleaned the extent of the gap should be tested by means of a feeler gauge, which is usually supplied with the machine. The best results are obtained by having a gap of one thirty-second of an inch, but this varies a little with different makes.

Cracked Cylinder Jacket.

If the supply of cooling water be inadequate or the cooling system be dirty there is always a chance that the jackets surrounding the cylinders may become cracked. If the crack be a large one the only thing is to buy a new cylinder block in place of the damaged one. But, as a general rule, the crack is only a small one, in which case it is a simple matter to effect a repair. There are two ways in which a cracked water jacket can be successfully mended. When the crack is less than a thirty-second of an inch in width the "rust joint" method can be employed. To effect a repair the water should be drained from the system and the drain cock closed. A piece of putty or tallow is then placed over the crack, care being taken not to allow any to enter. The cooling system is then filled with a solution of sal ammoniac to a level slightly above the top of the crack. This is allowed to remain in for half an hour. At the end of this period the system is drained and the engine run for a few minutes to warm the jacket. The process must be repeated three or four times. This forms a "rust joint," which will last for many years. The strength of the solution should be 1 lb. of sal ammoniac to 1 gallon of water.

The Steel Cement Method.

If the crack be too wide to repair by the above method, it can be filled with steel cement. The paint should be scraped off to a distance of $\frac{1}{2}$ inch all round the crack, and the edges bevelled off about $\frac{1}{4}$ inch. Very great care must be exercised in doing this part of the job, as it is an easy matter to break the casing completely. A sharp chisel should be used for the purpose. The cement mixture is then forced into the crack—a putty knife serves the purpose admirably—until the crack is filled, when the cement should be smoothed and rounded off. It should then be allowed to harden for two or three days. The cement takes on the properties of the surrounding metal and a perfect joint is formed.

QUEENSLAND RAIN-FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

Probably because of its strikingly ornamental timber the Tulipwood is one of the most widely known of Australian rain-forest trees. Its alternating bands of dark and pale wood evidently attracted the attention of settlers in the early days of colonisation as the timber and its qualities have been known for a long time. The species is termed *Harpullia pendula* by botanists. The trees attain a height of about 80 feet and a stem diameter of about 2 feet. The stem is sometimes flanged at the base in large trees; it is often irregular and grooved or angular in cross section. The bark is grey and is shed in round or irregular long flakes. The trees usually have a very large amount of pale or yellowish sapwood which is strongly contrasted with the dark-brown heartwood. The wood is very heavy and finely grained. The trees are frequently seen in cultivation in Brisbane streets. In nature the species is found as far south as the Bellinger River, in New South Wales (J. H. Maiden), and up as far as the Mulgrave River in North Queensland. The wood is used for parts of the external framing of billiard tables, for walking-sticks, and small wooden articles in which its brilliant colour contrasts become effective. The accompanying photographs illustrate the species as it is represented in the field and herbarium.



Photo. : W. D. Francis.]

PLATE 61.—TULIPWOOD (*Harpullia pendula*).

A tree growing among granite boulders in the Kin Kin rain forest.



Photo.: Dept. of Agriculture and Stock.]

PLATE 62.—TULIPWOOD (*Harpullia pendula*). (A) DRY FRUIT.

FRUITGROWING IN QUEENSLAND.**FIELD REPORT.**

The following report on the prospects of the fruit industry in the North Coast district has been received by the Minister for Agriculture and Stock (Hon. W. Forgan Smith) from Mr. R. L. Prest, of the Fruit Branch:—

MAROOCHY.

Bananas will generally be light and not of the best quality, especially those grown on the poorer forest country, having suffered severely during the past dry periods.

Pines.—A good crop is to be expected and plants will have benefited by the present rains. It is expected that the size will be generally smaller, perhaps an advantage in the case of those produced on the heavier soils of the Blackall Range, which as a rule are on the large side.

Citrus.—Will generally be light but, where the trees are receiving attention and feeding, of fair quality. It is unfortunate that soil, climatic, and cultural methods are not all that could be desired in this district, which generally accounts for the low condition of citrus orchards and the quality of fruit.

GAYNDAH.

Citrus.—Crop is generally medium to light, but promises to be of excellent quality, citrus production at present being in its infancy. The alluvial flats on the banks of the Burnett are well situated for irrigation, and climatic conditions are favourable for the production of high-grade Beauty of Glen Retreat mandarins, lemons, and navels. About 50 acres of new orchards have been planted during the past twelve months. This district can be recommended for citrus growing, provided care is taken to select the right class of soil and varieties for planting. Suitable water is available for irrigation.

ROCKHAMPTON, BONDOOLA, AND YEPPON.

Bananas.—Generally a medium to good crop of good quality fruit from the richer soils.

Pines.—A moderate to good crop where grown on suitable soils.

Citrus.—Generally light and of moderate quality, too many orchards being on uncongenial soil with climatic and cultural conditions not favourable for the production of first-grade fruits.

BYFIELD.

Bananas.—Will generally be good to very good, though a less tonnage may be expected than that of last year, which for the first six months of the year was approximately 360 tons of bananas, and over 200 tons of citrus fruits. The bananas harvested were from less than 200 acres of plantations. This slight falling-off of production may generally be put down to the past dry condition which prevailed in this district, and to the increase in the damage done by banana beetle-borer.

Citrus.—Generally light, but of fair quality considering the humidity under which they are grown. Citrus orchards have not received the attention needed for good orcharding, except in perhaps one case which is worthy of mention, Mr. C. H. Richter's orchard of 300 seedling mandarin and orange trees producing approximately 4,000 cases of marketable fruit, an example of the value of care and attention to the citrus orchard. The future prospects of this district appear good. There is one drawback to the district, that is the haulage of their produce over 28 miles of bad roads to the railhead at Yeppoon.

A HELPFUL AND INTERESTING JOURNAL.

A Nimbin (New South Wales) subscriber writes:—

"I must congratulate you on publishing such a splendid work. It is chock full of valuable and useful information, and it provides helpful and interesting reading not only for the farmer himself but for the rest of the family also."

GRADE STANDARDS FOR BANANAS.

MINISTERIAL STATEMENT.

The Minister for Agriculture and Stock (Mr. W. Forgan Smith) has informed the Press that for some time past he had been drawing the attention of the banana growers of Queensland to the necessity of placing their industry on a sound basis. In previous statements to the Press he had called attention to certain obvious weaknesses in organisation and methods, particularly with regard to marketing and the establishment of satisfactory grade standards. The importance of standard grading could not be stressed too much. Many industries at the present time were being injured because a few people in those industries failed to do the right thing, and because of such neglect injury was inflicted on others who conformed to the proscribed conditions and standards. It was necessary to do something further in the direction of providing that fruit of suitable quality only should be exported. The necessity for action along those lines had been accentuated in view of the complaints that had frequently reached here concerning the quality of Queensland bananas as supplied to the Southern markets. Unfortunately, investigation had shown that a proportion of the fruit so marketed justified some of those complaints. Regulations had been drafted under "*The Fruit and Vegetables Act of 1927*" for the purpose of providing grade standards for Cavendish bananas, the proposed grades being as under:—

Cased bananas shall be divided into three grades—"Choice," "Standard," or "Plain."

"Choice" shall mean sound fruit free from blemish, and having a minimum length of 8 inches and minimum circumference of 4½ inches.

"Standard" shall mean sound fruit free from blemish, and having a minimum length of 6½ inches and minimum circumference of 4½ inches.

"Plain" shall mean sound fruit having a minimum length of 5½ inches and a minimum circumference of 4 inches.

Note.—All measurements for length are to be taken on the outside of the curve, from the junction of the fruit at the stem and to the apex of the fruit.

The Minister added that it was anticipated that these standards would be operative on and after the 19th January, and that it was the intention of the Department to vigorously enforce the grade requirements. The bulk of our banana-growers supplied bananas of good quality, but there were in the industry some growers who, through neglect or other causes, marketed bananas of unsatisfactory size and quality. It was necessary that these delinquents should not be allowed to destroy the banana industry of Queensland.

Mr. Forgan Smith is causing copies of the proposed grade standards for bananas to be sent to the Ministers of Agriculture in other States, and is suggesting, in cases where standards for bananas have not been established, that grade standards similar to those to operate in Queensland shall be provided. The Minister is aware, because of seasonal conditions, and owing to much suitable banana-growing country going out of production because of the invasion of the "Brnchy Top" disease, that there has been some difficulty in raising fruit of satisfactory quality; but, on the other hand, there is evidence that some growers have attempted to grow bananas on land that is unsuitable for the purpose, while there are other growers who have failed to give the banana plant the necessary cultural attention. Others, again, have cut the bananas at too early a stage and before the fruit has filled and developed sufficiently to enable it to mature properly. These, however, are factors that cannot be allowed to prejudice the industry, and possibly lead to the present protection against black-grown bananas being removed.

A very rigid inspection will be made at leading stations and other points in transit, and inspectors have been instructed to enforce the regulations in all cases where such action is found necessary.

It, therefore, behoves all growers to grade, market, and present their fruit in accordance with the requirements of the Act and Regulations, as otherwise action will be taken against them. The Minister looks to the banana-growers of the State generally to give their cordial support and assistance to the Department in its efforts in this direction. By those means the industry could be placed on an unassailable foundation, and much better returns accrue to the growers.

SHEEP AND WOOL.

By W. A. RUSSELL, M.L.A.*

No better service can be rendered to a valuable industry in a State like Queensland than that men familiar with the workings of the industry should seek to enlist for it the enlightened interest of their fellow citizens. This is what Mr. Russell is doing, and the subjoined notes from an address by him will be read with appreciation by those who realise the place that wool—one of our greatest assets—occupies in our economy.

ON a subject such as this only a sketchy outline can be given in the course of a short address. Confining my remarks to Queensland will narrow somewhat the scope of my observations.

Historical Sketch.

The first sheep were introduced to Queensland by the late Robert Martin Collins, of Mundulan, Beaudesert. This was in the latter end of 1842. The sheep were merinos, and as such, had eventually to be transferred to the Downs and Western Queensland. It is generally recognised that coastal areas are not suitable for merinos. By the turn of the wheel in the history of the State, Mundulan now carries sheep again. A first class Romney Marsh stud has been established there, and at recent sales top price for the series was realised for Mundulan wool. The Darling Downs has carried sheep since 1843, when Patrick Leslie and Frederick Bracker stocked land around Warwick with sheep. By 1861, from the few thousands introduced in the 40's, the numbers had grown to over 4,000,000 by importations from the South, and their natural increase. From there, sheep were distributed all over the State.

At first, and for many years afterwards, the short-stapled Saxony wools only were grown, and flocks were strengthened by constant importations of rams from Germany, Steiger and Gadegast blood being the chief types used. The sheep of those days cut an average of less than 4 lb. of greasy wool, spinning not less than 80's count, which is superfine. You will probably often see, in the daily Press, statements such as 64's tops are quoted at 50d., &c. It would be well to explain what "counts" means. It is based on the number of hanks of yarn of 560 yards length spun from a pound of clean wool. As an illustration, a 60's count means 60 multiplied by 560 (yards) equals 33,600 yards of yarn in a sixty top. This by the way.

The Saxony and Silesian wools have a black tip, and they contained what would be considered to-day excessive yolk and fat, the scoured yield seldom going above 45 per cent. of clean wool. They were light-boned, narrow, low-set animals, their fine wool denoting fine or delicate constitutions. This type has now disappeared from Queensland, and it may be interesting to show why the short fine wools on comparatively small sheep have been replaced by the long, medium to fine wools grown on a big body with a strong constitution. It is true that a limited quantity of short superfine wool is still shorn in Queensland, but it comes from old ewes, that when young grew fine combing wool, and which had, through age, lost its length and strength of fibre.

The Wanganella Strain.

The improvement in weight of fleece is double now—7 lb. per head on an average, and was brought about by the introduction of the Wanganella type. The Wanganella type, called abroad the "Australian Merino," was founded by Messrs. Peppin Brothers, in 1859, when 100 ewes of nearly pure Rambouillet blood were brought from Victoria to Wanganella, in the Riverina. By the greatest of good fortune, a pure bred Rambouillet ram, called "Emperor," had been brought to Sydney. This ram was acquired by the Peppin Brothers, and he "nicked" wonderfully well with the ewes on Wanganella. From him are descended most of the splendid sheep in New South Wales and Queensland. A further addition to the flock was made when two pure Rambouillets were imported from America. These were sons of "Old Grimes," a son of "Golden Drop"—a ram for which its owners, Messrs. Hammond Brothers, of New York State, refused 25,000 dollars, or about

*In an address delivered before the Kurilpa Progress Association.

£5,000. These two rams also "nicked" splendidly with the progeny of "Emperor." There has been no outcross (fresh blood) introduced into the flock for nearly sixty years. The Rambouillets are French merinos bred from Spanish sheep stolen by Napoleon Bonaparte during the conquest of Spain. This Wanganella type, as I have said, is the Australian merino as distinguished from the Saxony types represented by the Tasmanian, Mudgee, and Western Victorian types. A stud has been formed in Queensland at Victoria Downs, Morven, and at the annual sheep sales may be seen splendid examples of the Wanganellas. They are big plain-bodied sheep, carrying a fleece weighing on an average over 24 lb. of greasy wool. Note the remarkable difference between the sheep of 100 years ago—the fleeces of which averaged 2½ lb. of wool—and those of the present day.

A good flock of merino sheep, ewes, and wethers will average to-day over 10 lb. of wool (greasy). The quality is medium, that is, from 64's to 66's count. Approximately the wools of Queensland are classed as "strong," "medium," and "fine." Strong means 60's to 64's count, medium 64's to 70's count, and fine 70's to 80's count; 80's and upwards is superfine, and there is little of it in this State. What the development of the merino has meant to Australia is in itself an absorbing story. It is sufficient for the moment to say that 60 per cent. of our exports are, in values, represented by the merino sheep's wool, sheepskins, &c., and, incidentally, 34½ per cent. of the income tax assessed in Queensland is paid by woolgrowers.

The Fat Lamb Trade.

There is another aspect of the sheep and wool industry in Queensland, and that is the establishment of a fat mutton and fat lamb export business. Generally speaking, pure merinos are not favoured abroad as mutton carcasses.

In most countries, and in some States of the Commonwealth where farming predominates over the pastoral business, sheep are looked upon as a tool of the farm. Sheep are scavengers in agriculture—that is, they eat anything in the vegetable family—even weeds. They are, besides, profitable not only for their wool, but for their flesh. They are easily handled, requiring far less attention than any of the other domesticated animals. The welfare of the sheep farmers of New Zealand is dependent upon their fat lamb and fat mutton export trade. Merinos are not used there excepting as one component of the crossbreds. Queensland is essentially a merino State, only 4 per cent. of her flocks being of British breeds or their crosses, yet our fat lambs can be, and have been bred quite as good as any New Zealand sheep. The precarious rainfall west of the Dividing Range, however, precludes the establishment of a fat lamb or fat mutton trade as a permanent business on a large scale. On the coastal areas there are much better conditions for sheep, for the rainfall is, at least, quite as good as that of New Zealand, with the added advantage of no winter as that season is known there.

In regard to the fleeces shorn from crossbreds, the price per lb. is at least 30 per cent. lower than for merinos, but the mutton and lamb more than make up in extra price and saleability. There is no reason why we should not build up an export trade for mutton and lamb here.

Sheep on the Coast.

Lately, sheep have been depastured on coastal areas and it has been shown that every ewe will return in lamb and wool not less than 20s. per head per annum, if the right breeds are used. The time has come when increased price per acre of land must induce intenser cultivation. With more cultivation must come the keeping of sheep, even if used only as "scavengers," or effective "weed killers," and few farms will be without their small flocks. From small beginnings it is possible that a big export business may be evolved.

Queensland the Healthiest Stock Country in the World.

The chief difficulties in the way of profitably keeping sheep may be shortly stated:—The greatest is blowfly infestation. Owing to the prevailing dry conditions in our pastoral areas, flies have not been in evidence to any great extent for two or three years. With the advent of good seasons, however, the pest is sure to become troublesome again. In my experiments on my station at Dalmally we discovered a treatment which gives 90 per cent. protection for a period of from about ten to twelve weeks. That is further than any others elsewhere have got. Dogs, and drought, too, take their toll of the flocks. Queensland, however, is freer of sheep diseases than any other country in the world.

Another Proof of Success—

The following letter from Mr. D. Baldie, "Dyburgh," Undina Siding, Cloncurry, Queensland, proves beyond doubt the satisfaction obtained from the use of VITA-LICK—

"28th November, 1928.

"We have a very severe drought here. I have a great opinion of Vita-Lick to give sheep strength in time of drought. Many of my sheep were in a dying condition about the end of September: up to that time I kept my sheep supplied with coarse salt only. My sheep had a dull sickly look; they were hollow. A lot of them would hang about the water and would not drink properly. I commenced to use Vita-Lick about the end of September. I commenced with one bag of Vita-Lick Concentrated to one bag salt. I kept my sheep well supplied with this mixture and am very pleased. My sheep have now a fresh look; they are all in good health, though most of them are very poor. Vita-Lick has made them all strong. I am an old sheep man and I must say I have never seen sheep so poor with so much strength on drought stricken country. Had I continued to give sheep salt only, many of them would be dead by now. I WISH I HAD KNOWN THE VALUE OF VITA-LICK IN THE 1926 DROUGHT."

This proves that the constant use of VITA-LICK is a most payable proposition.

Use "D" formula for Dry Feed. Use "G" formula for Green Feed.

VITA-LICK LIMITED

107-109 Kent Street :: SYDNEY



Sykes's Drench
MAKES GOOD COWS BETTER
 PER **16** PACKET



CLEANING COWS & HORSES
 IN A 16 PACKETS

Farming is a fine occupation, if

the weather conditions are favourable. Why not be independent of the weather by providing your own water supply and

Using Hume Pipes

Also for culverts, troughs, posts, etc.

Montague Road, South Brisbane
Branches Townsville and Kabra (Rockhampton)

The Most Reliable Concentrated Foods on the Market !

Bacal Products

The basis of these products is Cottonseed and Soya Bean Meal scientifically blended with other nutritive ingredients to form a perfectly balanced concentrate.

Bacal Cottonseed Meal

PRICE £11 PER TON

A very firm favourite with the Dairyman. We have numerous testimonials from satisfied clients.

Bacal Feed Meal

PRICE £11 PER TON

For dairy cows. A splendidly-balanced feed made from Cottonseed Meal, Soya Beans, Maize, Peanuts, & Wheat.

Bacal Sheep Cubes

PRICE £12 10s. PER TON

Thousands of tons fed to Queensland flocks during 1927.

Bacal Poultry Food

PRICE £14 10s. PER TON

The egg-producing concentrate.

Bacal Salt Lick

PRICE £13 10s. PER TON

The ideal stock conditioner.

ALL QUOTATIONS ARE F.O.R. WHINSTANES

Manufactured by

British Australian Cotton Assoc. Ltd.
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and obtainable from the Sole Distributors—

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also from all Produce Houses and Merchants.

We will be pleased to forward you pamphlets and prices at your request.

In the Wool Shed—A Tribute to Australian Workers.

Wool is shorn at a suitable time of the year, and sent to the coast to be sold at the periodical sales. To those who have never seen shearing, or wool being classed or sold, a short description of both phases of the great pastoral business may be interesting. After everything is got ready for the team of shearers who go from shed to shed, the ordinary station becomes an active scene of hard work. The harvest of the previous twelve months' work is about to be gathered. Sheep are being mustered in the paddocks, stores are laid in to provide food for the men in the shed, and on the appointed day the whistle blows for the start. The shearers dart into the pens where the "woolly" sheep are held, and picking the softest shearing animals, they carry them to the board. It is a bustling and interesting scene. The wool falls off the animal, before the machines, and presently the shorn sheep, white as snow, go down into the counting pens, and the shearer darts back for another one. To see a sheep shorn, one is reminded of the peeling of an orange. After the fleece is removed from the animal, the "picker-up" takes the fleece, and running along the board, throws it out just as if it were a small blanket. The wool rollers skirt off the different kinds of pieces and stained wool, and then, after throwing it in the sides, roll the fleece into a neat ball. The fleece then is placed in the appropriate bin. There are a number of these bins, each of which will contain a particular class of wool. Usually the classing is AAA., AA., A., Broken, 1st Pieces, 2nd Pieces, Stained Pieces, Bellies, and Locks. Sometimes, with some clips, there are clothing classes. Combing is wool that is suitable for the worsted trade. It is long enough to be fit for the combing machines. Clothing wools are used for the ordinary woollen trade. Combing causes the fibres of the wool to be laid parallel to each other, while with clothing wools, which are carded, the fibres are mixed up. Combing wools allow a much tighter spin to the yarn than clothing or carding wool. The latter are used for broadcloth, &c., and the main principle of carded wools is that after weaving they are felted by the application of moisture and heat. After the classer has placed the wool in its appropriate bin, the presser, when sufficient wool has accumulated, puts the particular quality into the boxes of the wool press. When filled, power is applied to squeeze the contained wool into about a third of its original size. The flaps are sewn on the top, and the bale is turned out. It is then branded with the name of the station or holding, its class, name, and number, and after being weighed, and its weight entered in the shed book, it is ready to be loaded on to the waiting wagon by which the clip is conveyed to the railhead for despatch to the sale centres at one or other of our sea ports. On arrival at the stores on the waterfront it is weighed and stacked away until the wool sales are due.

The Efficiency of our Marketing Methods—Australia's High Reputation.

The Australian methods of sale are practically perfect in efficiency, and are being copied over the whole world. Prior to the fixed date of sales, samples are extracted from the clip in store, representing a number of bales of each class. They are taken haphazardly from the bulk. The sample bales are placed, with probably a thousand others, on the well-lighted wool floors, and opened up, there to await inspection and valuation by buyers, who come from every civilised country. The importance to Queensland of the business may be judged when it is known that the sum of £1,300,000 sterling was paid for the wool sold during a recent sale. After the buyers have valued the wools, they assemble at the auction room in Parbury House in Eagle street. The sale room is a huge auditorium with rows of seats and desks rising in tiers back to the gallery where interested people, other than buyers, watch the proceedings. It is in the tiers that the buyers are seated with their catalogues marked before them. The auctioneer, with his assistants, is on a dias. It is marvellous to see the speed with which hundreds of thousands of pounds worth of wool is disposed of in one short afternoon. It is wonderful, too, to observe the certainty with which the auctioneer picks out the successive buyers from the groups of shouting and frantically gesticulating bidders. It is worth while studying the whole operation from the valuing floor to the sale room. The wool is then shipped to reach manufacturers in every corner of the civilised world.

The Australian wool market is looked upon abroad as being essentially honest. That is, the wools are, with very rare exceptions, pressed honestly at the wool sheds, and sold honestly at the sales. We have every reason to be proud of our reputation in wool matters.

HOW TO TREAT FLYBLOWN SHEEP.

Individual sheep can often be caught and treated in the paddock, but with a serious infestation it may be necessary to yard the flock or run them into a suitable corner so that they may be examined thoroughly and none may be missed. Struck sheep may show maggots either (a) in wounds in the skin, or (b) in the wool only.

Where the Maggots are found.

In the former, maggots are usually found in the depth of the wound, and, provided the wound is an open one, one dressing is usually fatal to all maggots, but such a wound is liable to be restruck in a few days. Sheep so affected therefore require dressing as often as they are restruck. These wounds may have been caused by injury, such as shear cuts, crow "picks," &c., and have subsequently become invaded by flies with consequent deposition of maggots, or the wounds may have followed a striking of the wool by maggots. In other cases the wound is not an open one. It is deep, or the sides are under-run, pus and maggots being to a greater or lesser extent hidden from sight. Such wounds require careful and often repeated dressing.

Remove Struck Wool and Maggots.

If the dressing is applied merely over the wool and rubbed well in the smaller maggots are destroyed, but the larger ones may overcome the effects of the dressing and move to new grounds to carry on their parasitic existence. Also, if the wool is not removed it is sometimes difficult to gauge the area in which the maggots are working, and consequently some may be missed when rubbing in the dressing.

The affected sheep is caught and held in a convenient position while the wool around the affected area is shorn off close to the skin in such a way as to define completely the struck patch, and to leave a border of at least an inch of normal wool all the way round; all "daggy," matted, or soiled wool about the breech of the sheep should be cut away. This lessens considerably the chances of a strike on some other part of the sheep. The struck area may be traced from the discolouration of the wool by the exudate that is given out. The wool close to the struck patch generally has a moist, clammy appearance, and is lacking in the lustre of normal healthy wool.

It is now desirable to remove all maggots. This can be done by striking the area briskly with the flat side of the shears, when the majority will be shaken off. Generally a few remain on, particularly in the case of wrinkly sheep, when they burrow down into the wrinkles. If time permits every maggot should be removed, but this is not always possible, and the dressing must serve to destroy the few that are left.

How to Apply the Dressing.

The dressing can be carried conveniently in a bottle, from which it may be poured on to the struck area, to be rubbed well in with the blades of the shears. It is necessary to rub the dressing well into the wrinkles and around the edges of the area, as the maggots move quickly and seek to hide themselves in the hollows of the wrinkles and in the unshorn wool.

After the wool has come away from a struck area a scab often forms over the raw patch, and maggots are frequently found under this scab. It is useless in such a case merely to apply the dressing over the scab, as it does not reach the maggots underneath, and they thrive as though nothing had been done to check them. It may seem to be retarding healing to remove a scab to get at the maggots, but this action is necessary.

With a badly struck sheep one dressing may be insufficient to cure the extensive wounds, hence it is necessary to continue the treatment until the wound is completely healed. The wound is liable to be restruck as long as there is moisture on the surface. It may scab over and become dry on the surface, but if the scab becomes knocked off before healing has taken place underneath a restrike may follow.

What an Effective Dressing should Do.

To be effective, a dressing should have the following properties:—(1) It should destroy the maggots without injuring the sheep or the wool; (2) it should be soothing and healing to the wound; (3) it should adhere to the wool and the affected

area of skin; (4) it should be repellent to the fly and thus prevent restrikes for a reasonable time.

After dressing—unless it is a very severe case, when it may be penned or paddocked separately to facilitate further dressing—the sheep can be let go again amongst the flock. One dressing is sufficient in most cases for the treatment of a strike, provided, of course, that it has been detected before the effects have become severe, which can only be assured by careful and regular inspection of the flock at sufficiently close intervals. It is a good plan for the stockman to keep the dressing in a bottle tied to his saddle, so that it is available at all times.—A. and P. Notes, N.S.W. Dept. Ag.

THE CULT OF THE COLT.*

FIRST RIDES—TYING-UP.

(By "U 9 L.")

We have mounted the colt once, got off him again, and then we mount and dismount several times. You see, it's all educational. The only thing I would impress upon you is to mount him slowly—climb on, struggle up, get on any old way at all so long as you get on. But, above everything else, be careful. Early impressions last longest, so some wise old fellow is once reported to have said, and if in your carelessness that colt douses you, then you have made a mess of things, and it is going to take a lot of work to erase that bad impression. Also I would ask of you to do all things in a natural manner. Try and let the little fellow know by your actions that it is quite the proper thing to which you are subjecting him, and that it is a natural process to finalise the education of every cultured horse. Some breakers even go further and do the off side as well. For my part, I could never see any force in that. It's running a risk which doesn't profit you or the colt commensurately with that risk. Nine out of ten men, myself included, are as awkward as a gin in boots when attempting the unusual. That off-side mount is never going to be used, and to do a thing which we may only effect clumsily and with infinite caution is not conducive to the colt's well being.

In the Saddle.

Before getting on the youngster finally it is well for us to take a persuader with us. The colt hasn't yet learned to carry a man, he doesn't know the rules of gee and whoa, and we want something which will prompt him to move. We want a thing which will frighten him without intimidating him, a thing he can feel without it hurting him, something which won't cut, will not bruise, and yet which is handy for us to use. The best thing of the lot, in my idea, is a length of garden hose—a piece about 2 feet long, or a shade longer. When you flap that on his ribs it doesn't hurt him, though he can feel it, and the resounding smack which comes from it is sufficient in volume to prompt the colt to go. Armed with it, we mount. The colt stands still, and you will notice as you swing on that uncertain swaying which comes from the horse. That, I think, is the little fellow learning to balance his load. He has never carried anything in his life before, and though he is bred to it he has to learn to balance before he can do anything else. We gather up the reins, seat ourselves comfortably in the saddle, and from the custom of long habit we give the reins a little shake and use the customary means to urge our mount to move. He does not! He hasn't the faintest idea what is wanted of him, and he stands and sways a little. When our heels hit him he might move forward sluggishly, not knowing what to do, and then the length of garden hose flops on his ribs.

This does something. The colt gives a bit of a bound, catches himself in the air, as it were, and steadies himself to balance his load. At that unwonted action the girths might pinch a bit, the saddle may be uncomfortable, and the colt decides to shift them. He knows only one way, that handed down a long line of ancestors as the proper means to shift anything—from a beast of prey to an unwanted rider—and he humps his back, lowers his head and tries to buck. A colt ridden the first time may buck. I use the word "may" to denote the mere possibility. Usually he cannot.

* From the "Pastoral Review" for September, 1928. Previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928), and January (1929) Journals, from the February, April, May, and July numbers of the "Pastoral Review."

Before a horse can buck he has got to be able to balance his load. A colt ridden the first time may only do that to a very weak extent. There are exceptions, of course, but I'm not referring to odd cases here. As soon as he has given his little display, and provided you are still on top, of course, your first and most important job is to soothe him. Let the little fellow know that there's nothing to hurt him, coax him to do another stride or two, and on the completion of each little forward motion tell him with all the earnestness you possess that he is a little marvel, there never was another like him, and to keep going. After riding him round the yard you will dismount and impress upon him the wonder of his progress, then ride him round the yard several times, across it, and do a few figures of 8 before the gate is opened and you take him outside.

Accustom the Colt to His Load.

When taking the colt outside, if it is possible at all, it makes the job so much easier if you have a man mounted on the old coacher. That merely serves as an inducement to go and do likewise when the old horse is ridden away. If there is no coacher, it really doesn't matter to any great extent. You go on your own. Some colts, as soon as they leave the confines of the yard, might be inclined to think that freedom is again theirs and go, or try to go, bush. Others need urging to do anything at all. And then there are others which will only progress in a series of erratic bounces, which the uninitiated call bucking. It isn't. Bucking, proper bucking, is an art which takes time to acquire. In whatever way your youngster gets over the ground you should mix it with him mentally the whole time. Drastic measures in correction are foolish at this stage of the game, and the object of the first riding is merely to try and accustom the colt to his load, to allow him to gain a certain degree of confidence, and to get him to move freely if possible. But even thus early I would impress on you the matter of educating the colt's mouth. For the love of goodness don't hang to it as though it were a sheet anchor, or a mainstay of some sort. A colt's mouth is for his guidance only, and for such a purpose alone may it be used. Gauge if you can the degree of pull which he is exerting, and against it use enough, and only enough, counter strength to achieve your own purpose. Never put more than half an ounce more weight on the reins than is necessary. Handle a colt's mouth lightly, with judgment and sympathy, and you have a horse which is responsive to your lightest touch and merest wish. It is worth doing, and it can be done in a manner which is not irksome either to rider or to beast.

Make the First Journey a Short One.

About half an hour's riding is quite sufficient for a start. Above all else, we do not want to weary this youngster in any of his lessons. Of course, tales are told of horses which have been ridden up to 40 miles on the day they were first mounted. Such things may be possible with an aged colt, but I wouldn't give you threepence a dozen for that fellow afterwards. In common with almost all other animals, a horse has only one really big day, or event, in him. When you have drained that you've sapped his vitality. That is the case nine times out of ten. To ride a colt 40 miles on his breaking day is equal to a ride of 100 miles or more when he is a set worker. A number of horses may do a stage of that sort and yet be able to come again. And a number, even of the good ones, may only do one stupendous day, and for ever after they are at the limit with just ordinary work. That is not included in the work of breaking, and I throw it in for good measure and merely as my own opinion.

Educating the Colt.

When you let the colt go after his first ride you may, or you may not, increase his education. Whether you do, or whether you don't, I would ask you particularly to try and impress on that child horse that he has done a good day's work, and that you are proud of him, that he should be proud of himself, and that to-morrow and the next day he is going to improve all the time. The rest of his breaking is merely a repetition, given over and over again, *ad nauseam*, till the youngster gains ease and proficiency in his work. Particularly I would ask of you when unsaddling to drag the saddle and gear off. Don't snap it away as if it was something which would bite him, but draw it away slowly, letting the girths and leathers caress him as they slide over his back, and in every way try and avoid frightening him of anything. The surest way of allaying a young horse's fears, I have found, is to let him know by every action of your own that there is nothing of which he should be afraid. Above all else, don't let him think you are in any way frightened, for as sure as eggs you will find that a horse borrows from and adopts something of the character of his rider. An excitable man will have excitable horses, nervousness begets fear, a

casual don't-care-a-cuss man will have similar horses, and he who is of a slow mentality and stubborn should never inflict upon horses his personality. I'm lecturing a dickens of a lot, and doing little. Let's do something.

Strong Gear Needed

We will now proceed, ladies and gentlemen, to give a demonstration of how a horse is taught to tie up. (These definitions make bad grammar. Fancy ending a sentence with a preposition!) To tie up a horse (that's better) we want strong gear. In fact, there's a halter and shank kept for this purpose alone. We catch our colt, tell him our usual plausible tale of how we are not going to hurt him and what a good little boy he is, and lead him to the post where this lesson is learned. It's a stout post, well and truly sunk and rammed, and to a swivel on top of it we attach the shank of the halter. If we have not got such a post, then we'll have to do the next best thing and tie him to a rail in the yard. But a post out in the centre of the yard, free of all encumbrances, is the thing. When the colt bounds, as he is going to do, he's not likely to get his legs tangled in the rails. He is not able to buck into the fence or skin his forehead, and when he throws himself on the ground and sulks, lying there with half-shut eyes and groaning grunts, he cannot get his legs under the bottom rail of the yard, and skin or break them when he struggles to rise. However, apart from anything else, the main thing is a halter which will stand the strain, and a shank which won't break. This is a negative lesson we are giving now—a thing which cannot be done—and we do not want to upset our good work by the shank parting and making liars of us and a bad example for the horse.

If a colt will not pull back it is advisable to make him do so? To a very slight extent, sir. If he won't take a strain it is not necessary to throw a bag at his head. As you walk by flit some dust in his face with a sideways kick of your boot. That will do it, and the horse does not know you are doing it on purpose. Anyway, if he doesn't pull at once, he will later on. If there is no other way of making him take hold, let some horses run through the yard past him and out of the gate. That will make him pull, and he has got to do so to find he cannot get away. You must lift a little hair and skin in this exercise, so please keep that fat-kerosene mixture handy. And if a colt lies down and grunts and will not pull, what about it then? A spreader is the thing for a colt like that. Get a spreader, lift it and tap one, two, three. That will bring him to his senses. Hit the colt? No. Hit that rope. The jar of it running through will bring him to his feet with a run, and also with a colt that sits back and hangs in the one position without a struggle, the spreader on that taut rope will also let him know he's not playing the game according to Hoyle.

THE DINGO—A FEW HINTS ON TRAPPING THE PEST.

Any discussions as to the possibilities of future development in the pastoral industry are generally concerned with breeding problems or the improvement of pastures by top-dressing, &c., and at the bottom of all of these suggestions is the one idea—an increased return per acre. It is contended, however, that it would not be possible, even by adopting these progressive methods, to maintain the carrying capacity of our pastoral country at its present level if means were not taken to cope with such pests as the rabbit, blowfly, and dingo. Just how much these pests decrease the carrying capacity, and consequently the return per acre, it would be most difficult to estimate, but it is generally agreed that the amount is considerable. It is also an interesting fact that the more work done in regard to the improvement of pastures and flocks, the greater is the attraction in many directions for these pests.

Periodically in these columns we have dealt with different aspects of the blowfly and rabbit problems, and it is intended now to treat with the trapping of dingoes as a method of exterminating that pest.

TRAPPING

If trapping is practised on an extensive scale it would pay some owners to employ a professional trapper under somewhat the same conditions as those governing the employment of rabbit trappers, paying a bonus for scalps. A trapper can attend from 150 to 200 traps, and may have to cover the total distance of 150 to 200 miles. The following information is supplied to meet the needs of those who do not consider their holdings large enough or badly enough infested to warrant the employment of such trappers.

The Traps.—Traps may be obtained from most ironmongery stores. They are of different sizes, the type generally used weighing 8 lb., with a space of 8 inches square between the open jaws. The jaws are provided with teeth which should not be too sharp, otherwise the dog may have his leg amputated or, perhaps, his foot nipped off and become, although lame, extremely troublesome by reason of his sharpened wits. A trap should not be too sensitive, or it may be sprung by rabbits, &c. To test it, drop pieces of wood of different weights from a height of 2 feet on to the plate; the piece which just sets it off should weigh 2 oz., and if this is not so the trap should be adjusted. Always overhaul traps after they have been sprung, in case they should be damaged or wrenched in some way.

Location of Traps.—This depends solely on the particular class of country. Behind logs and stones, on old dry watercourses, unused roads, tracks, &c., in the vicinity of waterholes, clear patches in scrub, are all good places. It should be borne in mind that, although the dingo may seek his quarry by very crooked and roundabout tracks, he returns to his lair by the shortest route. Other traps may be set off the track near bushes, shrubs, &c.

Setting the Trap.—There is some diversity of opinion as to whether the dingo will approach a spot if he suspects that man has recently been there. This is probably only correct with the veterans who have learnt all that man can teach them about traps. The younger ones and less cunning members of the species are known to follow men at some distance along a path.

The spot having been selected, first dig a hole about the same size as the trap and sufficiently deep to have the plate about $\frac{1}{4}$ inch below the surface of the ground. Open the trap and place it in the hole, cover the jaws and plate with a piece of brown paper about 14 inches square. Do not use white paper, for should some of the soil blow away and the paper become exposed, dogs will become suspicious and avoid the spot. Now pack the earth firmly around the jaws and spring, and cover the whole with earth. Make the place appear as natural as possible by fanning the surface of the soil with a hat, also by avoiding leaving pieces of paper, &c., lying about. The proximity of the trap may be marked by a dead bush or some similar natural object.

Never fasten a trap to the ground, as the dog may be able to tear himself free. It is better to rely on tracking him. Some trappers prefer to place poison on the trap, as the dog often bites it in his endeavours to free himself. This, however, is a matter of personal opinion, both methods being worth a trial.

DECOYS.

Several decoys have proved successful. Dragging the punctured carcass of a sheep over the ground by tying it to the axle of a cart and eventually leaving the carcass on the road in the line of traps is a good method.

Remember that most dogs would rather attack live sheep than dead ones, so that the paddock should be emptied before setting the traps, not only for the reason stated above, but also on account of the risk of sheep being caught by the very means which aim at their protection.

Oil of rhodium and oil of aniseed are frequently used, being placed in the boots of the trappers.

A live slut in heat led along the line of traps is an excellent method.

The dung of domestic dogs is perhaps one of the best decoys. Use about a dozen pellets and place the traps about 18 inches to 2 feet away, so that when the dingo approaches the decoy he will place his foot on the correct spot.

Dogs' urine is sometimes used, but is not always easy to obtain, and has to be renewed frequently owing to evaporation.

A excellent idea is to place the traps along the outside of a dog-proof fence; this will catch dogs that run along the fence seeking a place of ingress. If dogs have discovered a hole in the fence set a trap in the hole before repairing.

Traps should be inspected once or twice a week. In setting beside waterholes or under water where the track crosses a creek, it is desirable to approach the spot selected from the opposite side, wading through the water and thus leaving no tracks. In this case be sure that the trap is well greased before setting.—A.P. Notes, N.S.W. Dept. Ag.

THE STANTHORPE DISTRICT.

The following report (8th January, 1929) on the prospects of the Fruit Industry in the Stanthorpe district has been received by the Minister for Agriculture and Stock, the Hon. W. Forgan Smith, from Mr. H. St. J. Pratt, the Departmental representative in that district.—

"Most of the stone fruit has been harvested at satisfactory prices; the crop has not been as heavy as last year, and all varieties matured at least a fortnight earlier. Very little fruit has been sent to the factory, and if only more growers would realise the necessity and advantage of thinning out the whole crop would have been absorbed by the fresh fruit market at good prices.

English plums—President, Pond's Seedling, Grand Duke—will be on the market within a few days. It is anticipated that the prices will be good.

The Apple Crop.

The apple crop is about 30 per cent. lighter than last year, and the large quantities of Southern cold stored apples have had a very serious effect on prices for early varieties.

There will be a heavy crop of Jonathans this year, but other varieties will be considerably lighter, and it is expected that the prices towards the end of January and the months of February and March will be so much in excess of last year's that nett returns will be equalled if not exceeded.

Grapes.

The grape crop promises to be very satisfactory. The weather conditions so far have been most suitable, and there is very little disease in evidence—a great improvement on last year.

The earlier varieties will be on the market in about ten days.

The fruit fly "*Dacus Tryoni*" has done but very little damage so far, and up to the present no complaints have been received from Brisbane in that direction—to what extent the district will be invaded by the species "*Jarvisii*" yet remains to be seen, but will be known within the next month.

Vegetables.

Vegetables play a very prominent part in practically every orchard, and this season have been very much more remunerative than last season.

Many growers have done, and are doing, well out of beans, cabbages, and carrots.

Tomatoes will be on the light side this season, and it is expected that the factory supplies will be small. It is becoming more difficult every year to grow tomatoes successfully, and this is to a great extent attributable to the haphazard, happy-go-lucky methods of raising the plants in the seed beds. They are nearly always sown far too thickly, with the result that the plants are very weak and more subject to the many ills tomatoes are liable to contract.

The district, on the whole, is on the upward grade—there is a far better tone, and a feeling of optimism and security is in the air.

Marketing.

More growers are alive to the necessity of finding their own markets and avoiding the sending of large quantities of fruit and vegetables to the Brisbane markets. Many growers, through using a little initiative, have been enabled to dispose of practically the whole of their output privately, eliminating Brisbane altogether, which has been very much to their advantage.

Though a large number of deserted orchards have during the last few months been destroyed, there is still a considerable number that should be dealt with similarly before next season. They produce a quantity of inferior fruit which reduces the price of the good fruit grown by the bona fide orchardist. The original owners were unable to make a living off them, and the present tenants who take them on for the season are in most cases bitterly disappointed as to the results.

I am of the opinion that Stanthorpe has at last turned the corner, as it were, has to a great extent thrown off the ill effects of the boom, and each succeeding year will, I believe, bring greater prosperity to the district.

Answers to Correspondents.

An Ailing Draught Horse.

A Chowey farmer writes:—Some time ago one of my draught horses became sick. I first noticed this when I drove him to water. He was very reluctant to go. He was very stiff, particularly in the hind quarters, and I had quite a job to turn him round. I drenched him with linseed oil and saltpetre, as on a previous occasion he had some urinary disorder, the urine being nearly black in colour. He would stay in the shed all day, only going out to graze at evening. I was feeding him on lucerne chaff, and he seemed to be getting right, as all stiffness left him. I then noticed a swelling on the under part of his chest, spreading back towards the belly, and at first was quite soft, afterwards being harder. He had difficulty in eating and drinking for a time, afterwards gradually becoming better, until he was quite normal. A cough, which ended in a sort of a whistle, developed, with a slight running from the nose. The droppings at this stage were of a very green colour, intermingled with a sort of a white slime. Later on the horse was to all outward appearance quite fit, except for the swelling under his chest. His hocks began to swell, also the thighs and buttocks and the shoulder muscles (or rather the muscle above the brand). He began to go off his feed and drink and appeared to be very full, would blow very much with the slightest exertion, and in, say, 200 yards would have to stop for a breather. I had a last look at him for the night and he was quite all right, nibbling round the shed, and in the morning he was dead, having to all appearance died without a struggle. If you could tell me what the trouble was I would appreciate it very much, as several neighbours were interested in the symptoms produced."

Mr. Veterinary Surgeon McGown advises:—"The symptoms described in this case are very conflicting, as they point to various diseases, and it is therefore very difficult to form a correct diagnosis. However, from the information given it appears that this animal was suffering from some form of kidney trouble. Had the kidneys been sent to this Department for examination the answer would have been more satisfactory."

BOTANY.

From the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.

Clathrus or Net Fungus.

INQUIRER (Brisbane)—

The fungus is a species of *Clathrus* or net fungus. The net fungi belong to the family *Phalloidæ* or stinkhorn fungi. The peculiarity of the members of this family is that the spores are borne in a wet, slimy, brown medium known as the gleba. In the net fungi the gleba is borne on the inner face of the meshes. Flies and other carrion-feeding insects visit the gleba and carry about the spores on their bodies, and thus the plant is spread.

Woods Identified.

J.S. (Woombye)—The three weeds are—

1. *Euthorbia pilulifera*, the asthma weed.—This plant is a very common weed in cultivation in Queensland, and attracted much attention some years ago as affording relief to persons suffering from asthma. The whole herb was dried and used as a tea about the same strength as ordinary tea. It seems to give relief, but the effects apparently wear off after a short time.
2. *Richardsonia scabra*.—This plant was "boomed" some years ago as a fodder under the name of Mexican clover. It does not, however, belong to the true clover family, and as far as our experience goes in Queensland seems to be left untouched by stock. It is rather a bad weed in cultivation, particularly in the pineapple plantations of the North Coast Line.
3. *Oxalis corymbosa*, a species of wood sorrel most commonly known in Queensland simply as *Oxalis*. It is a pernicious weed in gardens and does not seem to be particularly bad in large areas. It is a native of South America, and was probably introduced as an ornamental plant, as many of the genus are rather pretty and favourites in garden culture.

Wild Poppy—A Poisonous Plant.

J.W. (Cooroy)—

The plant commonly known as the Wild Poppy in Queensland is *Argemone mexicana*, variety *ochroleuca*, known by its rather silvery, prickly leaves and very pale yellow flowers. It is poisonous to stock, but is generally left untouched by them. The only cases we have on record of poisoning by it are some where the plant had been cut and allowed to wilt and then eaten by calves.

Tree Lucerne.

A.H. (Killara, Sydney)—

The true Tree Lucerne (*Medicago arborea*) seems to have died out entirely in Queensland. It has been introduced into various countries, but never seems to have taken on as a fodder crop. Professor N. E. Hansen, who was the first agricultural explorer appointed by the United States Department of Agriculture under their scheme of foreign exploration, visited various parts of Europe and Asia to especially collect seeds of species of *Medicago*, *Trifolium*, and allied plants and reported on *Medicago arborea* as follows:—

"*Medicago arborea* L. is the largest representative of the *Medicago* genus, attaining a height of upwards of 10 feet. It is a native of the Mediterranean region of Europe, Asia, and North Africa, and is the 'cytisus' mentioned by ancient Greek and Roman writers as an excellent forage plant. It is especially common on the islands of the Greek archipelago and in southern Italy. It is cultivated to a limited extent in various portions of its range, but, as it gets woody too quickly and is less productive, the ordinary lucerne is much more in favour. It is a favourite wild plant, as it furnishes rich feed for cattle, sheep, and goats. In old plants the wood is dark and hard like ebony, and its use for sabre handles, canes, and beads is recorded.

"The writer's personal observations in gathering wild seeds of this plant are confined to Mount Lycabettos in Athens, near Mars Hill, on which the apostle Paul preached to the Athenians, and to the cliffs near the outskirts of Naples, Italy, where the plants were found growing in the crevices of rocks, where they were inaccessible to any live stock. The plants seemed to flourish in the driest possible crevices in almost perpendicular cliffs, where, apparently, no water could get to them.

"*Medicago arborea* appears of value in hot, dry places where few other plants will live, but its greatest value is perhaps to be looked for from the standpoint of breeding. Some of its remarkable vigour could with advantage be imparted to the other *Medicagos* of more northern origin. This species has been tried in a limited way in Southern California as an ornamental plant, and north of its main range in Europe is considered only as an ornamental shrub, needing winter protection. The large, bright yellow flowers are abundantly produced."

It seems to have some virtue as a fodder for fairly dry, hot countries and should be a success in parts of Queensland and New South Wales, though we doubt if it has many advantages over a lot of the existing fodders we have here already.

Grass Identified (*Cenchrus australis*).

G.B. (Degilbo)—

Your specimen is *Cenchrus australis*, a hillside grass or scrub grass. It is also commonly known in Queensland by the ridiculous name of Scotchman's lice. It is a very coarse grass, and has little value as a fodder on this account. The prickly burrs often catch flies and other insects.

Bird of Paradise Flower.

J.D. (Mt. Tambourine)—

Your specimen is *Phitecolobium grandiflorum*, known on Tambourine and other places as Bird of Paradise Flower, Rainbow Flower, Tassel Flower, and other names. The genus *Phitecolobium* is one widely spread over the tropics, and several species occur in Queensland. The timber is often rather prettily streaked, and from this character is sometimes known as bacon wood.

A Common Weed (*Cleome aculeata*).

L.L. (Cairns)—

Your specimen is *Cleome aculeata*, a small plant of the caper family, a native of tropical America now a common naturalised weed in the East Indies, and introduced into Queensland within recent years probably from either Java or Singapore. Though the plant is fairly common, we do not know an English name applied to it. The plant so far has not manifested itself as a bad weed, and does not seem to call for any special method of eradication.

Nut Grass Eradication.

G.S. (Rosewood)—

The Director of Agriculture, Mr. H. C. Quodling, advises that no method of total eradication has so far been discovered for this pest. Some permanent crop, such as lucerne, will undoubtedly keep it temporarily suppressed, and other quick-growing crops such as, Japanese Millet, White Panicum, Giant Panicum, and Sudan Grass, are useful during the summer months, whilst Wheat (preferably Florence in your district), Skinless and Cape Barley, Algerian, Ruakura, or Sunrise Oats can be utilised during the winter months.

The insect referred to by you is probably that known as *Antonina australis* or Nut Grass coccid. This insect is frequently found feeding on the underground portions of Nut Grass, but in spite of its association with that plant it is not regarded favourably as a control factor. It is certainly incapable of killing out Nut Grass where normal cultivation operations are carried out, but it is claimed as being beneficial where the land in which Nut Grass is growing has not been disturbed for some time. As it is suspected that this insect may feed on the roots of other grasses, its general distribution should not be undertaken, at least for the present or until more is known about it.

Wild Millet.

F.L.H. (Memerambi, Nanango Line)—

Your specimen is *Panicum crus-galli*, commonly known as the wild millet. It is a grass with a wide distribution over the warmer parts of the world, and several forms occur in Queensland, the one you sent being most abundant as a weed in cultivation. The grass has some considerable value as a fodder and is generally regarded as the parent of such well-known fodders as Japanese Millet and White Panicum.

Curative Plants.

F.A. (Cairns)—

Your specimen is *Coelospermum reticulatum*, a shrub of the family Rubiaceæ, very common in Queensland, with a fairly wide range from Gladstone to the Cairns district, growing in rather dry country. Though common, we have not heard a local name for it or of its possessing any curative properties for diarrhœa.

A plant very common in parts of North Queensland, particularly in the Gulf country, is *Grewia polygona*; this plant has important value as a cure for diarrhœa, dysentery, &c., the leaves being either chewed or made into a decoction.

"Curled Dock."

M.R. (Warwick)—

In sending specimens of weeds such as Dock, it is better to send a piece of the seed-head and the leaf rather than the clean seeds. However, the seeds you send belong to *Rumex crispus*, the "Curled Dock," a very common plant, widely spread as a weed over practically the whole of the temperate regions of the world, and very common as a farm weed in Queensland. The plant is not known to possess any poisonous properties. Birds are very fond of the seeds, and the roots are used in medicine.

"Sovereign Wood."

J.L.T. (Atherton)—

Your specimen is *Terminalia sericocarpa*, in some places known as Sovereign Wood on account of the yellow timber; in other places known as Damson on account of the drupaceous fruit.

Trees Suitable for the Roma District.

H.J.S. (Roma)—

Write to Mr. G. B. Brooks, Department of Agriculture, Rockhampton, who, no doubt, will be able to supply you with a few seeds of the Algaroba. The trees likely to grow well at Mount Abundance are:—

Kurrajong (*Sterculia diversifolia*).

Celtis sinensis, commonly known in Queensland as Portuguese Elm. This tree does well in Western Queensland, and has some reputation as a fodder. We could, perhaps, send you a few seeds as we do not think they can be obtained from nurserymen.

Pepper Tree (*Schinus molle*).

Crow's Ash (*Flindersia australis*).

Moreton Bay Fig (*Ficus macrophylla*).

Citron-scented Gum (*Eucalyptus citriodora*).

Jacaranda (*Jacaranda mimosaeformis*).

Camphor laurel (*Cinnamomum camphora*).

Phytolacca or Bellasombra Tree (*Phytolacca dioica*).—This tree is a rapid grower and has some considerable value as a fodder tree. We do not think seeds can be obtained through the ordinary commercial channels, but you may obtain some from Mr. R. Dick, Purga, via Ipswich. He sells seeds, we understand, at 2s. a large packet.

Bunya Pine (*Araucaria bidwillii*).

Hoop Pine (*Araucaria Cunninghamii*).

Insigis Pine (*Pinus insignis*).

The Bottle Tree.

E.D.B. (Biggenden)—

1. Two species of Bottle Tree occur in Queensland, the Broad Leaf Bottle Tree (*Sterculia trichasiphon*) and the Narrow Leaf Bottle Tree (*Sterculia rupestris*). The latter is the species that forms the perfect bottle-shape trunks, and it is confined to Queensland. The former is recorded from the Northern Territory as well as Queensland.
2. These are really the only two kinds of "bottle" tree. There is another species of *Sterculia* known in Queensland as the Scrub Bottle Tree (*Sterculia discolor*). It is common in the coastal scrubs of Southern Queensland, but the stems do not form a perfect bottle; they are simply stout and soft.
3. There is no cheap botanical handbook to enable you to identify Queensland wild flowers. The "Queensland Flora," by the late F. M. Bailey, price 30s. for a set of six volumes, is, perhaps, rather too big for your purpose. We would gladly name any specimens you care to send from time to time, and when perhaps you get to know the plants a bit better, you could obtain a copy of "The Queensland Flora" and use it to advantage.

Birdlime Tree.

C. (Cedar Creek, via Beenleigh)—

Your specimen is *Cordia myxa*, sometimes known as the Birdlime Tree owing to the sticky nature of the fruit pulp in the ripe fruits. It is a tree with a very wide distribution through North Australia to India, Ceylon, and as far west as Egypt, and is thought to have furnished the wood from which the Egyptians constructed their mummy cases. Its dried fruit is used in India as a medicine and is said to be purgative.

PIG RAISING.

From the outgoing mail of the Instructor in Pig Raising, Mr. E. J. Shelton.

Worms and Lice in Pigs.

G.W.B. (Umbiram)—

Your pigs are suffering from lice and, probably, worms as well. Thoroughly clean the pens, sheds, yards, and troughs, and let the sunlight get into every corner. Troughs should be cleaned frequently and regularly. Probably all the pigs are infested with hog lice, which are usually found behind the ears and under the body on the inside of the legs, where they lay their tiny white eggs. To kill lice, mix six parts of any waste oil, such as old motor oil or fish oil, with one part of kerosene, and apply the mixture by a cloth or brush to every part of each pig, including the insides of the ears. This treatment should be repeated four or five days after the first application, when more lice eggs will have hatched out. Another fairly satisfactory way of applying this mixture is by saturating a piece of bagging in the oil and kerosene and tying it around a solid post in the pig yard, and the pigs will rub themselves against it, but for immediate results it would be better to apply it by hand. Then, if practicable, spray all cracks and crevices about the pens with a weak solution of any disinfectant to kill any lice which may be lying about. To treat for worms a dose of turpentine and castor oil is most satisfactory. For a pig weighing 100 lb. live weight a dose would be half a teaspoonful of turpentine mixed with two tablespoonfuls of castor oil, and this dose should be mixed with a little warm skim milk and fed in the troughs first thing in the morning, the pigs having been starved since the previous morning's feed. The dose should be adjusted to suit the size of the pigs, and care should be taken to see that the pigs all get their share of the medicine in the milk. This dose of oil and turps should be repeated ten or twelve days later. Remember that medicinal treatment is of little use unless proper sanitation of the piggery is carried out. Burn up all the present bedding in the pens. A plentiful supply of greenstuff, preferably lucerne, is always beneficial for pigs of all ages.

OBITUARY.**HENRY CRAMER HAWTHORN.**

On the 26th December last the death occurred at Warwick of Mr. H. C. Hawthorn, Inspector of Stock for the Warwick district. The late Mr. Hawthorn was sixty-two years of age, and, prior to entering the service, was very well known in pastoral circles on the Downs and elsewhere in the State. A native of Tasmania he was attracted to the mainland by the wider opportunities offering in the pastoral business. As a stockman his ability was quickly recognised, and he was appointed overseer on Glengallan Station, where he remained for a number of years. Later on he took over the management from time to time of several large Western properties, including Coreena Station, near Barcaldine. He afterwards held a responsible position at the Government Stock Experiment Station at Yeerongpilly for a considerable time. Later Mr. Hawthorn was appointed to the charge of the Stock Office at Killarney, where he remained for a number of years. He was subsequently appointed Stock Inspector at Barcaldine, and six years later was transferred to Warwick. Throughout most of the pastoral areas of the State, but particularly on the Downs and in the south-west, Mr. Hawthorn was greatly esteemed, and his sound knowledge of stock and pastoral experience were always at the disposal of farmers and graziers, by whom he was highly appreciated as a courteous and able officer. The late Mr. Hawthorn left a widow and grown-up family, to whom the Minister and officers of the Department of Agriculture and Stock have extended their deepest sympathy. The officers of the Stock Branch especially feel the double loss of capable colleagues in both Mr. Hawthorn and Mr. Smith.

GEORGE ANDREW SMITH.

The death of Mr. G. A. Smith, Inspector of Slaughter-houses, Rockhampton, on the 22nd of December last, as the result of a motor accident, was generally regretted, not only in the service, but among all sections of the community which he served so well. The late officer entered the public service in February, 1915, after having passed the prescribed examination, and was stationed from time to time at Toowoomba, Mackay, Gympie, Charters Towers, and Rockhampton. He was only forty-seven years of age at the time of his death, and left a widow and one child. Included among many expressions of sorrow and sympathy were messages from the Minister and officers of the Department of Agriculture and Stock.

EDWIN LYLE VIDLER.

The news of the tragic and lonely death of Mr. Edwin Lyle Vidler, as the result of an accident whilst climbing Mount Lindesay, a high peak of the Macpherson Range, on 26th December, was received with profound regret. The late Mr. Vidler was barely twenty-three years of age. He was educated at the Toowoomba Grammar School, and passed the Junior University examination with merit in science subjects. He joined the staff of the Department of Agriculture and Stock in July, 1924, and served in several branches, finally transferring to the chemical laboratory.

The deceased was a young man of striking individuality. He was not attracted by any organised sport, but found an outlet for his remarkable energy in photographic tours across open country and on precipitous heights. He was an intrepid and experienced mountain climber. In company with his friend, Mr. A. A. Salmon, a fellow-officer of this Department, and his companion on many adventurous excursions, he had climbed the chief peaks of the Glass Houses and other mountains, and, in one instance, out of sheer enthusiasm, he made a thrilling ascent of Crookneck in record time. At Easter, 1928, with Mr. Salmon, he climbed Mount Lindesay successfully from the eastern side. He left Brisbane on the 24th December to attempt the ascent by the difficult northern face alone, as he was unable to obtain a companion. The mountaineer's long-delayed return caused a party to set out on the 29th, and after an arduous and perilous search his body was found by his comrade, Mr. Salmon, at the foot of a crevice at a height of about 3,400 feet. It is presumed that he met his lonely death on 26th December by the loosening of a piece of rock upon which he depended, and falling, was killed instantaneously. Owing to the inaccessible nature of the country his remains were laid to rest near the spot where his friends found him.

All those who knew the deceased feel the loss of one whose mercurial temperament and bright personality were as a freshening breeze to more stolid natures. He was a very fine type of young man, studious and assiduous, a general favourite of the officers of the Department, and gave promise of becoming a valued officer and citizen. Had he lived longer his amazing vitality could not but have left its mark in the world.

Like so many other good Australians, the very glory of unconquerable youth, who set out for other and foreign fields to achieve a lofty purpose only to fall a willing sacrifice, he was buried where he fell. He rests in the shadow of the stark escarpment he assailed rising sheer above him, sheltered at its base by the bush he loved so well and with the birds he also loved to chant for him a never-ending requiem. The inexpressibly sad little ceremony of interment was performed early on New Year's Day. The police were assisted by two local gentlemen and three members of the search party. Constable Carter conducted a brief funeral service. At the head of the grave stands a neat cross made of hardwood by the dead man's cousin, Mr. Victor King. On the cross is a leaden plate carrying the name and age of the deceased, and the date of his death. A cairn of stones was built to definitely mark the spot.

On behalf of the Minister for Agriculture and Stock (Mr. W. Forgan Smith), the Under Secretary (Mr. E. Graham), the Assistant Under Secretary (Mr. R. Wilson), and other officers of the Department, a letter of condolence was sent to the father of the deceased, who is a resident of Bell.

General Notes.

Staff Changes and Appointments.

Mr. J. L. F. Foran, Stock Experiment Station, Townsville, has been seconded for duty to the Agricultural Chemical Laboratory, Brisbane.

Messrs. C. F. Andrews and T. Jones, of Tamaree, have been appointed Honorary Inspectors under and for the purposes of the Diseases in Plants Acts.

Government Representatives have been appointed and Members elected to the following Dingo Boards:—

Bungil Dingo Board—Mr. W. H. Thrupp, Roma, Government Representative; Messrs. C. Harms, P. Hoskin, G. F. Lalor, and H. H. McGowan, Members.

Mitchell West Dingo Board—The District Inspector of Stock, Longreach, Government Representative; Messrs. T. S. L. Armstrong, W. G. C. Avery, A. A. Moffat, and R. J. Willcocks, Members.

Leichhardt South Dingo Board—The District Inspector of Stock, Emerald, Government Representative; Messrs. M. M. Kavanagh, J. F. Le Feuvre, W. T. M. Penhallurick, and J. C. Wells, Members.

Messrs. A. H. Bauman and C. E. Holmes, of Charters Towers and Townsville, respectively, have been appointed Temporary Rangers under the Animals and Birds Acts, as from the 19th February, 1929.

Constables E. W. Conway and J. H. Gordon, of Gilliat and Dobbryn, respectively, have been appointed Inspectors of Slaughter-houses.

Appointments and elections made in connection with the undermentioned Dingo Boards:—

Bulloo Dingo Board—Mr. W. Williams, Thargomindah, Government Representative; Messrs. E. A. Sherwin, H. M. L. Hughes, H. L. Rutledge, and W. Carwardine, Members.

Belyando Dingo Board—The Inspector of Stock, Clermont, Government Representative; Messrs. W. R. Tindale, T. P. McCann, H. R. Goodwin, and W. E. Moller, Members.

Clermont Dingo Board—Mr. H. C. S. Griffin, Folfang, Clermont, Government Representative; Messrs. E. H. Templeton, K. Maclean, F. N. W. Cavaye, and W. J. Clements, Members.

Dr. H. W. Kerr, M.Sc., Ph.D., Sugar Soil Chemist, Bureau of Sugar Experiment Stations, has been appointed Acting Director of Sugar Experiment Stations as from 1st February, 1929, and during the absence of Mr. Easterby (Director) on leave.

Mr. S. Graham, of Upper Coomera, S.C. Line, has been appointed Honorary Inspector under the Diseases in Plants Acts.

Mr. J. T. Tod, of Goomburra, has been appointed Growers' Representative for District No. 4 on the Wheat Board until the 31st August, 1929.

The appointment of the Officer in Charge of Police at Mareeba as Acting Inspector of Stock has been cancelled as from 31st December, 1928.

Constable H. H. Taylor, of Kuridala, has been appointed Inspector of Slaughter-houses, as from 4th December, 1928.

Mr. H. V. King, of Toowoomba, has been appointed Government Representative on the Darling Downs Dingo Board, and Messrs. C. J. Allen, A. C. V. Bligh, C. Cooke, and E. R. Rutledge have been elected Members of that Board.

Mr. L. A. MacKenzie, of Telson, Dingo, has been appointed Government Representative on the Leichhardt East Dingo Board, and Messrs. C. A. Barnard, C. Dobbs, J. W. McKenzie, and A. J. Salsbury have been elected Members of that Board.

Mr. G. Burton, of Cambooya, has been appointed Chairman of the Canary Seed Board until 28th February, 1930.

It has been approved that the lands of the canegrowers in the Mackay District who supplied cane to the Proserpine Central Sugar Mill during the 1928 season, be included in the Mackay Cane Pest Infected Area.

The following have been appointed Members of the Northern Pig Board:—Messrs. F. H. Hyde, Peeramon; C. A. Hough, Tolga; D. Johnston, Malanda; R. T. Croker, Malanda; R. Campbell, Peeramon; and L. R. Macgregor, Director of Marketing. They will hold office as from 1st January, 1929, to 31st December, 1929.

The position of Sales and Possessions Officer, Agricultural Bank, Brisbane, has been abolished.

The appointment of Mr. L. J. W. Taylor, as Inspector, Agricultural Bank, has been confirmed, as from 14th May, 1928.

The appointment of Mr. E. W. Weller, formerly of Birkdale, as Honorary Inspector, Diseases in Plants Acts, has been rescinded.

The following appointments have been made in the Bureau of Sugar Experiment Stations:—

Mr. A. F. Bell, B.Sc., Investigations Officer (Plant Pathology), to be Sugar Cane Pathologist;

Mr. N. Bennett, B.Sc., Investigations Officer (Sugar Mill Technology), to be Sugar Technologist and

Mr. H. W. Kerr, M.Sc., Investigations Officer (Soils), to be Sugar Soil Chemist;

as from 1st January, 1929.

Messrs. M. Flanagan (Brisbane), A. Black (Maryborough), F. A. Johnson (Maryborough), and W. L. Conn (Charters Towers), have been appointed Inspectors of Slaughter-houses, on probation.

Mr. D. A. Logan, Inspector of Stock, Mackay, has been appointed also Inspector under the Diseases in Plants Acts.

Mr. T. Tobin, of Round Mountain, Gatton, has again been appointed Government Representative on the West Moreton Dingo Board, and Messrs. H. H. Daniel, P. Dwyer, J. Logan, and J. H. Pitman have been elected Members of that Board.

Messrs. F. Tickle and M. B. Smith, of Mooloo, via Gympie, have been appointed Honorary Inspectors under the Diseases in Plants Acts.

Messrs. C. S. Clydesdale and J. J. McKeon, Assistant Instructors in Agriculture, have been appointed Instructors in Agriculture as from 1st July, 1928; Mr. L. A. Downey, Assistant Instructor in Pig Raising has been appointed Instructor in Pig Raising as from 1st July, 1928; and Messrs. A. Nagle and R. E. Haseler, Field Assistants, have been appointed Instructors in Cotton Culture as from 1st July, 1928.

Messrs. M. Coleman (Nobby), G. Burton (Cambooya), and L. R. Macgregor (Director of Marketing), have been appointed Members of the Canary Seed Board, as from 1st December, 1928, to 28th February, 1930.

The Officer in Charge of Police at Julia Creek has been appointed Acting Inspector of Stock.

The appointment of Mr. B. Dunbavand, as Inspector of Slaughter-houses, Ingham, has been confirmed, as from 1st June, 1928.

The Mining Warden and Police Magistrate, Charters Towers, has been appointed Government Representative on the Dalrymple Dingo Board, and the following have been elected Members of that Board:—Messrs. T. J. Salmon, A. Shepherd, E. F. D. White, and C. Woodburn.

Messrs. H. E. E. Larsen, E. P. Damm, A. O. Rohde, and S. Ukran, of Goomboorian; via Gympie, and Messrs. H. W. Baker, W. R. Perkins, and H. C. Poulsen, of Mooloolah, have been appointed Honorary Inspectors under the Diseases in Plants Acts.

The appointment of Mr. J. King, as Inspector, Agricultural Bank, has been confirmed, as from 15th May, 1928.

Mr. G. Bates, Assistant to Entomologist, has been appointed Assistant Entomologist, Bureau of Sugar Experiment Stations, as from 28th April, 1929.

The Officer in Charge of Police, Inglewood, has been appointed Acting Inspector of Stock.

It has been approved that Mr. R. Pusey, Inspector of Stock at Muttaborra, be transferred to the South Burnett Cleansing Area, and that Mr. T. Douglas be appointed Inspector of Stock. Mr. Douglas's headquarters will be at Kingaroy.

The services of Mr. H. J. Walker as Temporary Stock Assistant, Brisbane, will be continued from 1st January, 1929, to 30th June, 1929.

Mr. J. McLaren, Cunnamulla, has been appointed Government Representative on the Paroo Dingo Board, and Messrs. F. H. Cuzens, C. C. Campbell, A. Leeds, junr., and W. H. Young have been elected Members of that Board.

Mr. P. J. Short has been appointed Temporary Inspector of Slaughter-houses as from 4th February, 1929, to 20th March, 1929, and Mr. F. C. Shaw has been appointed Temporary Assistant Inspector of Stock and Slaughter-houses from 7th January, 1929, to 1st February, 1929.

Mr. R. B. Morwood, M.Sc., Assistant to Pathologist, has been appointed Assistant Pathologist as from 1st January, 1929.

Stock Foods Regulations.

In consequence of the amendment by Parliament during the recent session of "*The Stock Foods Act of 1919*," all Regulations under that Act have been revoked, and new Regulations approved.

Local Sugar Cane Prices Boards.

By Order in Council under the Regulation of Sugar Cane Prices Acts, members of all Local Sugar Cane Prices Boards have been removed, in order to prepare the way for the usual annual elections.

Grade Standards for Oranges and Mandarins.

In addition to the grade standards for cavendish bananas mentioned previously, the grade standards for oranges and mandarins, approved under the Fruit and Vegetables Act, have been amended. The new standards are as follow:—

Oranges and mandarins shall be sized into the following sizes—2½ inches, 2½ inches, 2½ inches, and "large":—

2½ inches shall include fruit of a size of 2½ inches or greater diameter, but less than 2½ inches;

2½ inches shall include fruit of a size of 2½ inches or greater diameter, but less than 2½ inches;

2½ inches shall include fruit of a size of 2½ inches or greater diameter, but less than 3 inches;

"Large" shall include fruit of a size of 3 inches or over in diameter.

Wheat Board.

Notice has been issued of intention to constitute a Wheat Board under and for the purposes of "*The Primary Producers' Organisation and Marketing Acts, 1926 to 1928*" (instead of under the original Wheat Pool Acts), such Board to deal with wheat produced in Queensland during the seasons 1929-30, 1930-31, 1931-32, and 1932-33. The Board, if constituted, will consist of five elected representatives of growers and the Director of Marketing. One representative shall be elected from each of the five districts at present used for the existing Wheat Board. Persons eligible to vote on any referendum or election in connection with the proposed Board shall be persons who at any time during the twelve months immediately preceding the date of such referendum or election grew for sale wheat in any portion of Queensland.

Any petition for a poll to decide whether the proposed Board shall be constituted must be signed by at least fifty growers as above, and must reach the Minister on or before the twenty-seventh day of February, 1929. Persons who have grown or who have growing for sale wheat, since 1st January, 1928, are invited to send their names and addresses to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Border Restrictions.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, announced recently that his attention had been drawn to a paragraph headed "Border Restrictions Modified," which appeared in the morning papers of the 16th instant.

The matter referred to therein has been, and is at present the subject of correspondence between the Minister for Agriculture in New South Wales and himself. Mr. Smith mentioned that he had received intimation from Mr. Thorby, Minister for Agriculture, New South Wales, of the intention of the Minister to modify some of the conditions relative to stock proceeding from Queensland to New South Wales, but until such time as these matters had been gazetted they would not have the force of law, or be applicable to stock intended for the Southern States. He refrained from making an announcement of this matter until finality had been attained, for, in addition to the matters referred to in the Press references, there were further matters which he had brought under the notice of Mr. Thorby, and he anticipated receiving a reply from him upon these matters at an early date.

It is possible that Mr. Russell, M.L.A., had been advised of the communication that had been received by him from Mr. Thorby, but, of course, until the changes in the conditions were effected by "Gazette" notice, the existing regulations stood.

When the proposed alterations become law he will advise stock owners of the changed conditions governing the movement of stock over the Southern border.

Banana Weevil Borer Investigation Committee.

Following on the change in membership of the Banana Sectional Group, Regulation 127 under the Fruit Marketing Organisation Acts has been amended to provide that Messrs. F. J. Calvert, Mount Mellum, Landsborough, and C. E. Vines, Kin Kin, via Cooran, take the place of Messrs. Edwards and Warland, on the Investigation Committee formed in connection with the offering of a reward for an effective scheme of treatment for the control of the banana weevil borer.

Drainage of Irrigated Lands at Theodore.

"T.A.G." (Theodore, Dawson Valley) writes:—Going over the irrigated blocks on which cotton, maize, and lucerne is growing one finds dead patches due to water-logging. This can only be remedied by better drainage. The level nature of the land and close texture of the soil makes surface drainage here impracticable. The next best thing to consider is underground tile drainage. Tile drainage, notwithstanding its high initial cost, will pay in greatly increased production. It is well known that tile-drained lands actually hold more water in suspension in the soil than undrained land, while at the same time keeping the soil in better physical condition. By tile draining, too, aeration of the soil is promoted appreciably.

Sugar Levies.

Regulations have been approved under the Primary Producers' Organisation and Marketing Acts providing for the making by the Inkerman and South Johnstone Central Sugar Mill Suppliers' Committees of levies on cane supplied to their respective mills during the season commencing 1st May, 1928, and ending on 28th February, 1929, such levies to be at the rate of 1d., in each instance, on every ton of cane supplied. Petitions for polls, signed by not less than 100 growers, in each instance, will be received by the Minister on or before 23rd January next. The amounts derived from the levies, if approved, will be used for defraying expenses incurred by the respective mill suppliers' committees in connection with the recent waterside workers' strike.

Levies by Mourilyan, Invieta, and Tully River Central Sugar Mill Suppliers' Committees.

Regulations have been approved under the Primary Producers' Organisation and Marketing Acts providing for the Mourilyan, Invieta, and Tully River Central Sugar Mill Suppliers' Committees to make levies on cane supplied to their respective mills during the season commencing 1st May, 1928, and ending on 28th February, 1929, at the rate of ½d. for Mourilyan and Invieta and 1d. for Tully River Central, on every ton of cane supplied. Petitions, signed by not less than eighty growers in each instance, will be received by the Under Secretary, on or before the 9th January, 1929, asking for a poll to be taken on the above levies respectively. The amounts of such levies are to be used for defraying expenses incurred by the respective mill suppliers' committees in connection with the recent waterside workers' strike.

Broom Millet Board.

Messrs. Hans Niemeyer, of Hatton Vale, Laidley, and Erich Max Schneider, of Binjour Plateau, Gayndah, are the only nominations received for the election of two growers' representatives for the Broom Millet Board. These two gentlemen are the sitting members of the Board, and they, with the Director of Marketing, Mr. L. R. Macgregor, will constitute the new Board for a further twelve months.

A notice was issued in the "Government Gazette" on the 8th of December last advising the intention of the Governor in Council to extend the operations of the Broom Millet Board until the 31st October, 1931. At the same time attention was drawn to the fact that a petition might be sent in up to the 9th of January, 1929, asking that a referendum be conducted to decide whether or not the Broom Millet Board should be so extended.

No such petition has been received, and consequently the Broom Millet Board will now remain in existence until the 31st October, 1931.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

Flag Smut of Wheat.

A Proclamation has been issued declaring Flag Smut (*Urocystis tritici* Keern) to be a disease within the meaning of the Diseases in Plants Acts, and Regulations approved under those Acts provide that the occupier or owner of any land on which wheat plants are growing that are infested with or affected by Flag Smut, shall burn all stubble of such wheat plants immediately after harvesting. The penalty for a breach is £5 for the first offence, and not exceeding £20 for a second or subsequent offence.

The Pumpkin Beetle.

The Minister for Agriculture and Stock (Mr. Forgan Smith) commented recently on the fact that the pumpkin beetle is at present abnormally abundant in several districts in South-Eastern Queensland. This pest is capable of inflicting severe losses on pumpkins, rockmelons, watermelons, cucumbers, and vegetable marrows. The beetle is a distinctly marked little insect of an orange-yellow colour with two very conspicuous black blotches on each wing-cover. It measures about one-quarter of an inch in length, and feeds on both the foliage and flowers of attacked plants.

With respect to the control of this pest, the Chief Entomologist (Mr. Veitch) advises that a very considerable measure of success may be obtained by spraying or dusting with arsenate of lead. The spray should be used at the rate of 1 lb. of the powder form of arsenate of lead to 25 gallons of water, and should be thoroughly applied to both sides of the leaves. If the poison is applied as a dust hydrated lime should be employed as the carrier, using 1 lb. of the powder form of arsenate of lead to 4 or 5 lb. of the hydrated lime. The dust is best applied in the early morning, and for its application a hand dusting machine is thoroughly satisfactory. If a dusting machine is not available, the dust can be placed in a cheese cloth bag and then dusted on to the plants by shaking it over them.

Young plants may be protected from attack if the seedlings are covered with some form of netting or hessian which has been stretched over a suitable framework to prevent the beetles gaining access to the seedlings. Such a protective measure, however, is practicable only on a small scale. It will, nevertheless, tide the seedlings over a very dangerous period when the attack of a few beetles may very seriously injure or even kill the infested plants.

A further control measure that has been suggested by some investigators is to liberally dust the plants with wood ashes or lime. This procedure is said to act as a satisfactory repellent in outbreaks of ordinary severity.

Proposed Banana Board.

Notice has been issued of intention to constitute a Banana Board under the Primary Producers' Organisation and Marketing Acts, such Board to deal with all bananas produced in Queensland for sale, for a period of three years as from the date of the Order constituting the Board. The Board to deal with the commodity will consist of five elected representatives of growers and the Director of Marketing. For the purpose of election of growers' representatives, the State has been divided into five Districts as follows, each district to elect one representative:—

District No. 1—That part of the State north of and including St. Lawrence;

District No. 2—Areas served by the railway stations on the North Coast Line and Branches south of St. Lawrence to and including Theebine;

District No. 3—Areas served by railway stations on the North Coast Line and Branches south of Theebine to and including Monkland;

District No. 4—Areas served by the railway stations on the North Coast Line and Branches south of Monkland to and including Nambour;

District No. 5—Areas served by the railway stations on the North Coast Line and Branches, Main Line and Branches, South Coast Line, and Suburban Lines south of Nambour to the New South Wales border, including the Bay islands.

Upon the making of the proposed Order in Council, all the commodity (bananas) shall be divested from the growers and become vested in and be the property of the Board. Persons deemed to be growers and eligible to vote on any referendum or election in connection with the said Board prior to the making of the proposed Order shall be all persons who, at any time since the 1st January, 1928, have had for sale, bananas growing within any part of the State of Queensland; growers eligible to vote on any referendum or election held after the proposed Order has been made shall be all persons who, at any time during the twelve months preceding the date of such poll harvested for sale bananas produced within any part of the State of Queensland.

Proposed Honey Board.

Notice has been issued under the Primary Producers' Organisation and Marketing Acts of intention to constitute a Honey Board to deal with honey and beeswax produced in Queensland by persons owning not less than five hives of bees in movable frames, such Board to be operative for a period of five years. The Board will consist of four representatives of growers and the Director of Marketing, and will be elected annually.

Persons eligible to vote on any referendum or election in connection with the proposed Board shall be persons who own, within a period of twelve months prior to the date of such election or referendum, at least five hives of bees in movable frames and market the honey and beeswax therefrom. Any petition for a poll to decide whether the proposed Board shall be constituted must be signed by forty growers as above and must reach the Minister before 13th February, 1929, and growers are invited to send their names and addresses at once to the Under Secretary, Department of Agriculture and Stock.

Egg Board.

An Order in Council has been approved, amending a previous Order in Council, constituting the Egg Board. The amending Order provides that the election of the Board shall be held in December or at such other time decided by the Minister. The original Order provided for the election to be held in December.

Primary Producers' Co-operative Association.

Regulation 37 under the Primary Producers' Co-operative Associations Acts has been amended to provide that auditors employed by an Association shall retire in each year and shall be eligible for re-election subject to the approval of the Auditor-General. An additional Regulation No. 59 provides that a firm of public accountants may be eligible to be appointed as auditors of an association in the firm name where all partners of the firm hold licenses under the Regulations, and may sign balance-sheets and reports in the firm name.

State Wheat Board Election.

The result of the election for a growers' representative to fill the vacancy caused by the resignation of Mr. W. J. T. Neale, Allora, for the No. 4 Wheat Board District, was:—

| | Votes. |
|---|--------|
| James Theodore Tod (Goomburra) | 247 |
| Heinrich Wilhelm Hinrichsen (Newholm, Clifton) | 78 |
| Charles George Shooter (Ellinthorp) | 64 |
| Edwin Sylvester Maher (Allora) | 41 |
| Philip Henry Imhoff (Upper Forest Springs, via Clifton) | 40 |
| Edward James Doyle (Allora) | 11 |

Mr. Tod will accordingly fill the position lately held by Mr. Neale.

A Disturbed Balance.

The problem is to increase the production of primary products, and while in an ideal state we should have a town population fully employed in handling the primary produce and in supplying the many needs of the primary producers and of one another, our conditions are such that we have to import many articles that are manufactured in other countries. If we look squarely at the facts we have to interpret the presence of unemployed in our cities as evidence that the balance of town and country populations has been gravely disturbed in the wrong direction, temporarily at least. The academic economist has an easy way out of such a difficulty. All he has to do is to export—theoretically, of course—the surplus labour, and the balance is restored.—“Lyttleton Times” (N.Z.).

Mere Book Knowledge not Education.

“The aim of education,” said Mr. Ramsay MacDonald in a recent speech, “is not fulfilled when you simply make pupils well-stocked reference files. Knowledge is not education. You can know as much as the wisest man in the world ever knew—unless his wisdom consisted of the affairs of the soul, I except that—but so far as his book knowledge is concerned, material knowledge and the knowledge of things, a man may know all that there is to be known and in the end be a consummate fool. The aim of education is not merely the acquiring of knowledge. It is far more akin to this—the capacity to use what you do know, and the man who can use a little of his knowledge is a far better-educated man than the man who knows a great deal and cannot use anything at all of it.”

The City-ward Drift.

Growth of cities implies the development of that "home market" which, because it is close at hand and constant, is, as Adam Smith shows, the best of all markets in proportion to its size. And if the farmer has occasion to complain of the scarcity of agricultural labour, he should remember that this is partly due to the displacement of manual processes by machinery, which, even in the primary industries, has deprived large numbers of rural workers of employment and driven them to the towns for refuge. If we add to these the surplus immigrants who through a mistaken policy have been attracted to the country before any adequate provision has been made for them, and who have therefore never been able to "get on the land," we have gone some way towards explaining the "urban drift."—Auckland "Star" (N.Z.).

Production and Marketing.

In Great Britain, probably, we have tended in the past to think too much of production and not enough of marketing. Even now there are recurrent complaints that British manufacturers are inadequately informed on the special requirements of foreign buyers. Probably, too, we have given insufficient thought to the selection and training of salesmen for their particular work. The kind of training required by a British salesman, indeed, must be considered a training not so much in verbal dexterity as in the intelligent understanding of the goods in which he deals. A traveller in textile goods, for example, should be able to answer almost any technical question that can be put to him by a buyer, without need to refer to the factory for information. In all industries there is ample scope for technical training of this kind, and the higher the character of British goods the higher will be the character of the salesmanship required to do them justice.—"Yorkshire Post."

Are We Over Organised?

"We are overdone with reformers and organisers, and underdone with people of sufficient balance and judgment to realise the complexities of the problem and the difficulties inherent in it. We have suffered a great deal from the dangers of action founded on misunderstanding. There is never any doubt as to what is the right course for the individual. There is always grave doubt on the same question for groups of individuals, or for society as a whole. If that be true, wisdom would seem to lie in a lack of action except by individuals. That, I think, will be the tendency of the next generation or two. We have had far too much collective action and far too little encouragement for the individual. Such difficulties as beset us may be traced to these tendencies, and the hope of the future lies in a reversion of them."—Sir Ernest Benn, writing in "Producer and Consumer."

Brains in Industry.

"Just as the modern employer—who really to-day is not an individual or a board of directors but thousands of shareholders—has advanced in wisdom and vision beyond the old-time 'masters,' so the workers, with the great spread of elementary, secondary, and university education, are also more fitted to realise the dignity and the responsibilities of their place in industry as well as the vast potentialities of modern science and industry as a whole. A new craftsmanship of the brain has arisen to replace the old craftsmanship of the hand. These new craftsmen in whose care is placed the control and operation of great machines will not lightly throw their livelihood, their future, their firm, and their industry into the melting pot of strife and dissension. The clouds of industrial turmoil are clearing and the future is bright with the hopes of real progress towards a common understanding. That understanding will come from a quality which has never yet failed the British nation, and that is the intelligence and sound common sense of the vast majority of its people."—Lord Melchett in the "Manchester Evening News."

Service Before Self—and Pelf.

"No employee could do his best in a dehumanised concern. The worst wage-slave was not the poorest-paid worker, but the person, whether in a well-paid station or a lowly one, who worked merely for money. Ideal conditions could be arrived at only by great effort and by sympathetic understanding or understanding sympathy. They were conscious of their high calling, rendering a useful service by clothing and furnishing their fellows, and it followed that they could take no mean advantage, but should help to make business a great, thrilling experience, and not a treadmill with breaks for sleep. With right ideas, all would radiate happiness on their way to work, and enjoy an honourable weariness when they left it.—Mr. W. B. Veysey, chairman of John Dyer, Ltd., a successful British business enterprise.

The Kelpie—Its Origin.

What is the origin of the kelpie sheep dog? Is it an American product or is it related in some way to the Australian dingo?

Although recognised as a good sheep dog, very little appears to be known of the kelpie. One writer declares that it is a new type of dog that originated in America, but this writer failed to show its origin.

Writing on this subject, Mr. J. Hogan, of Bungonia (N.S.W.), states that the kelpie in reality is an Australian dog, the place of its origin being Queensland. In the first place it was a cross between the Queensland native dog and a smooth-haired terrier (probably a Border Collie). This was the starting point, but the first cross, naturally, was a mongrel and good for nothing. The next cross produced a different class of dog with the strain of the dingo, and gradually developed into the sheep dog. It bears a great resemblance to the dingo in its habits, but not in its body. Its colour generally is black with smooth hair, whereas the dingo is brown. The true kelpie is black and tan, with pricked ears. Like the dingo, it is very cunning, and although a good worker among sheep it loses its temper while at work and will snap or bite the sheep, and a muzzle has then to be used to break the dog of this habit. The kelpie requires careful watching, as in many instances it has been found that after two or three years' work among sheep it turns to killing—a vice inherited from the dingo. The kelpie has numerous friends among sheepmen, many of whom declare that it has not the vices that suggest its origin from the dingo.

Moving to Better Things.

The world has been moving to something better. It is always a better world than it was. Light comes into dark places, the crooked ways are made straight, the evil passes away. We must not be deceived because bad things are fighting hard for their life. The strongholds of evil do not fall like the walls of Jericho, at a sound of the trumpet or a mighty shout; they are brought down by some strange power that runs through all things, and is kept alive by all who believe. It is the faith that moves mountains which rules the world from age to age. Truth has been often on the scaffold. Wrong has been often on the throne. In the end the love of right and truth and justice and freedom and mercy has never been beaten in the world. The love of these things has broken the might of kings and shattered their empires to pieces.—Mr. Arthur Mee, the editor of the "Children's Newspaper," in its 500th number.

Go Back to Adam Smith.

"It is not fashionable for a man in trade to-day to inquire how he can increase his output. His thoughts are concentrated on the problem of limiting his market and maintaining his prices. Rubber, cotton, sugar, and many other commodities cry aloud of the folly of the method. It seems to me that here is work for our schools of economics. They should be able to make the people understand that they must stand in the market-place to be hired or in the queue to be rationed. We must have competition among producers or else we must go under as consumers; there is no middle course. A producer point of view leads us all the time to be tinkering with some detail or other—coal, ships, buttons, films, or French cherries; from the Prime Minister downwards we never seem to think of the nation as a whole, we are always favouring some one part at the expense of the rest. So I ask, would it not be wise for a time to forget about work and wages and prices and foreigners and empires, and all the rest of the popular political stock-in-trade, and go back to Adam Smith and his 'plentiful subsistence for the people'?"—Sir Ernest Benn, in the "Cambridge Review."

Swat that Fly.

With modern architecture, modern drainage, modern drying and heating and cooling and cleansing systems we can all be quite healthy if we do what prudence requires. But we cannot, unless by accident, remain healthy if we are careless and unclean. Flies, alone, as Dr. Lester reminded us recently, threaten us every hour of the day right through the summer, and although we all know this, or should, very few of us make a really sustained and intelligent effort to destroy flies whenever and wherever they appear. It is also the case that the methods by which rubbish is removed and destroyed in all New Zealand towns are "lamentably primitive and inefficient." Although we may have to put up with these methods a little longer, we should make it clear that we do not approve of them, and in the meantime bestir ourselves as individuals to nullify their evil effects.—Christchurch (N.Z.) "Press."

The Simple Things of Life

"My formula for a book to simplicity itself—an outdoor setting of land in which I have lived until, as Mary Austin expresses it, I know 'the procession of the year.' Then I people the location with the men and women who live there, and on my pages write down their story of joy and sorrow commingled as living among them I know it to be. This is the secret of any appeal that my work may make. And I want to say for such people as I put into books, that in the plain, old-fashioned country homes where I have lived, I have known such wealth of loving consideration, such fidelity between husband and wife, such obedience in children, such constancy to purpose, such whole-souled love for friends and neighbours, such absence of jealousy, pettiness and rivalry, as my city critics do not know is in existence. I never could write a historical novel, because I want my history embellished with anything on earth save fiction. I never could write of society, because I know just enough about it to know that the more I know, the less I wish to know. I have read a few 'problem' novels, and they appeal to me as a wandering over nasty, lawless subjects and situations of the most ancient type, under new names. There is nothing remaining for me but the woods, and the people I meet there. For every bad man and woman I ever have known I have met, lived with and intimately known an overwhelming number of strictly clean, decent people, and upon the lives of these I base what I write."—Gene Stratton Porter.

Courage in Excelsis.

"Visiting the wards of our hospital, for there perhaps as nowhere else we see courage in its purest form. The slings and arrows of what may appear to them an outrageous fortune are faced with a smile and with the head erect; there is no crouching as in despair, I leave those walls filled with a great wonder, humbled with a great humility, proud that in this world there are men and women and children with a courage edged so fine. We who practice the science and the art of medicine are sometimes said to work very close to those shadows which are cast upon the world by the turrets of oblivion. The shadows are suffering and disease, demands of Moloch which never seem to be satisfied, reminders perhaps that here we have no abiding city. And of those shadows surely the deepest is that of the disease or accident which, once encountered, either saps the vital spark from day to day or (and to some it seems the harder fate) leaves the poor sufferer living but crippled and, it may be, helpless. Some of these cases are among the real tragedies of human life, and so often they come to those least able, it would seem, to bear them."—Professor John Fraser, M.C., M.D.

Land as an Investment.

As an avenue for investment, land has fallen into neglect. The explanation notoriously consists in the inflation of values of land, and it may be doubted whether even yet, despite the efforts of the past few years to restore broad acres to their economic value, actual stability has been reached. The conditions, however, that affect the rural industries are distinctly promising. An exceptional production of dairy produce is anticipated this year; the wool sales so far in the present series yielded satisfactory prices and the extent of the clips that are to be offered is expected to be higher than last year; and the meat export season has been a favourable one. These circumstances should certainly increase the attractiveness of land as a security for investment, while the inevitable effect of the steady accumulation of money that has been going on must be an easing of the price of money.—(Otago (N.Z.) Daily Times.)

Milk and Thunderstorms.

According to "Chem. Weekblad," a Dutch milk supplying company has made some investigations on the subject of the influence of thunderstorms on the development of acid in milk in a hope of being able to throw some light on superstitious tales of milk suddenly turning sour during electrical storms. It was investigated whether milk would turn sour more quickly if exposed to an electrified atmosphere than if kept out of it, and it was shown that neither the effect of alternate current, nor that of constant current of equal tension, as observed during thunderstorms, would have any influence on the quantity of acid in the milk, although exposed for fifteen hours. The opinion is, therefore, expressed, that electrical power, whether of atmospheric origin or otherwise, has no noticeable influence whatever on the rate at which the spontaneous acidification of milk takes place. It is thought that the real cause of milk turning sour during a thunderstorm is found in the higher atmospheric temperature generally prevailing previous to such storms.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.

ARTIFICIAL FEEDING.

To be successfully achieved, this is a matter which entails for the mother or nurse much work and never-failing attention to details.

With a healthy mother and child it should never be recommended, much less advocated as being superior to natural feeding. Indeed, the bottle-fed baby should be regarded as an unfortunate infant who, through very definite misfortune, has been deprived of that great birthright—his mother's milk. The death rate among artificially fed babies is, and always will be, higher than among those who are breast fed. Statistics tell us that of the babies who die in their first year many more are artificially fed than breast fed. This is a fact which should be known to, and well considered by, every woman who contemplates weaning a baby from his mother's milk and giving him a bottle.

Unfortunately, in some cases, owing to the death or prolonged illness of the mother, artificial feeding cannot be avoided. In such cases those in charge of the child should see to it that they obtain reliable information as regards his feeding. A brief illness—e.g., influenza—should never be regarded as an indication for weaning. Babies have frequently been fed by their mothers through attacks of influenza without any ill effects resulting. When the mother is too ill to nurse the child, the milk supply should be kept up by regularly and daily expressing the milk from the breasts.

Remember that the younger the child is when taken off the mother's milk and put on artificial food the greater are the risks attending the change. Up to weaning age—i.e., about nine months—before deciding to take a child off his mother's milk and bottle feed him, always make quite sure that the weaning is necessary. With a healthy mother and normal baby this is very rarely the case. Over 90 per cent. of women are able to feed their infants, if not wholly, at least partly.

Many mothers are inclined to think that their milk is not agreeing with baby, when what is really at fault is not their milk but their method of feeding. Sometimes baby gets wind or colic, or cries a good deal after he has been fed. Sometimes he sleeps badly at night. But all these conditions can be, and frequently are, due to faulty feeding—perhaps irregular feeding or overfeeding and not to any defect in the mother's milk. Sometimes the mother thinks that her milk looks too thin and watery, and that such a poor-looking fluid cannot contain enough nourishment for baby. But many analyses have proved that this watery-looking milk is just as rich and contains as much nourishment as the richer looking specimens. In some cases the mother is tempted to wean her baby because she sees glowing advertisements with pictures of large fat babies who have been fed on some artificial food, and she decides that she will give her baby the food which achieved such wonderful results. Babies fed on patent foods are frequently very fat, and very heavy, but there are no advantages, and several definite disadvantages in this excess of weight. The overweight baby is too heavy for his mother to carry about comfortably, especially in hot weather, consequently he may not be taken out for his necessary daily walk, as he could be if he weighed less. On account of his weight he does not learn to sit up, crawl, or walk as early as the child of normal weight, so is more helpless, requires more attention, and has to be carried about longer by his mother. Then, when he does walk, there is risk that his soft, growing bones may not be able to support his weight, and he may become bandy. So let every mother realise that, in spite of glowing advertisements, no artificial food is as good for her baby as his own mother's milk. Further, if baby has not been thriving on his natural food, he is likely to do much worse when given an artificial food.

No mother should wean her baby because she discovers that she has not quite enough food for him. She should give what there is and make up to the necessary amount with a little artificial food, given after—never before—the breast feed. In

such cases condensed milk must not be given to complete the feeding. It is very sweet, much sweeter than mother's milk; baby likes sweet things, and in a very short time he will show his preference by refusing to take his mother's milk. So the food which completes the feeding must be only slightly sweet. For such cases sugar of milk, which is only faintly sweet, should be used instead of cane sugar. Many people think that mother's milk and an artificial food cannot be given together, but this is a mistake. They can be given together; in fact, the mother's milk helps baby to digest the artificial food, and the child who is getting even a little of his mother's milk with the artificial food will thrive better than the one who is getting artificial food only.

IMPORTANT POINTS TO REMEMBER.

In cases where artificial food is absolutely unavoidable special attention must be paid to the following three points:—

Cleanliness; the food given; and the baby's ability to digest that special food. Notice that cleanliness is put first. A moment's thought will tell you that the best artificial food, given in an uncleanly way, could be a source of serious risk to the baby. This need for absolute cleanliness makes artificial feeding a matter entailing a great deal of work. The food and all utensils must be constantly guarded. If fresh milk is used the source of the supply must be inquired into to ensure that it is satisfactory. In the home it must be protected from dirt and contamination. Bottles, teats, and all other utensils used—and there are a good many—must receive care and attention before and after each feeding.

The upright feeding bottle is a good type to use; the rounded inner surface is easily cleaned, and there is no unnecessary valve. Also, its shape permits of the contents being easily warmed, when necessary, simply by standing it in a basin of hot water. Failing this, the boat-shaped bottle is best. The hole in the teat should be small enough to prevent the food from dripping into the child's mouth. It is of the right size when baby, sucking vigorously, takes his feed in about twenty minutes. A fact that mothers sometimes forget is that the hole in the teat quickly enlarges, and one that is the right size to-day may in two or three days be too large, and permit of baby getting his food much too quickly. So watch must be kept and the teat renewed when necessary.

The Food.—Milk is the only food for babies. When good fresh cow's milk is available, this is better than dried or preserved milk. The milk should be scalded as soon as possible. Raw milk is dangerous unless it is very fresh, very clean, and comes from cows free from tuberculosis. Boiled milk is easier to digest than raw milk, and so long as the baby is given a little orange juice daily after it is three months' old there is no disadvantage in using boiled milk. The simplest method is to put the milk in a small saucepan and take it off the stove as soon as it begins to boil. If pasteurised milk, delivered in sealed bottles, is being used it should not be boiled unless it has to be kept more than twelve hours. After that it should be boiled.

It is impossible to give a diet scale which will suit every baby, but it may be well to have some guide for feeding a suddenly weaned infant in an emergency, and until special instructions can be obtained from a doctor or welfare nurse. For a baby under six months commence with one part cow's milk to two parts water, and increase gradually until equal parts milk and water are being given. For a baby over six months commence with equal parts milk and water, and increase until two parts milk and one of water are being given. To each half-pint of the mixture add one level household tablespoonful of sugar. Dried milks can be useful when fresh milk is not obtainable, when the source of the milk supply is not satisfactory, in hot weather when milk will not keep, or when travelling. The full strength recommended on the tins should never be given at first, but about half this, and gradually increased. Healthy babies often thrive very well on these dried milks, but very young or delicate babies may be unable to digest them sufficiently.

Household tablespoons, which vary greatly in size, are not reliable for measuring baby's food; if one must be used, select a small one, but it is better to have accurate measures. The markings on the feeding bottles are usually correct.

The third point which must receive special attention is the child's ability to deal with any special food. It is a well-known fact that a food which will agree with one baby, and on which it will grow and thrive, may disagree with another, and even make it very ill. A baby's ability to tolerate a food can only be judged by giving it. This serves to emphasise the fact that babies should have, whenever possible, their mother's milk, which does agree with them. As regards regularity, time of feeding, &c., the artificially fed baby is treated in the same way as the naturally fed infant. If fed three-hourly, feed at 6 and 9 a.m., 12 midday and 3, 6 and 10 p.m. If four-hourly fed, and most normal babies are better fed so, feed at 6 and 10 a.m. and 2, 6, and 10 p.m. Give no night feeds from birth; make no exceptions to this rule.

THE CARE OF THE BABY.

Far more babies die during the hot months than during the cool season. Let no one blame the Queensland climate for this. Babies thrive and keep healthy in hot weather when proper care is taken. With a little knowledge of infant management all our unnecessary summer mortality might be prevented. During hot weather the baby should not be overclothed. He should have plenty of fresh air day and night, but should be shaded from the direct rays of the sun when he is out of doors, as he ought to be every day. During hot weather he is more thirsty and should be given a drink of water whenever he wants it. As he uses very little body fuel to keep up his body temperature, he needs rather less food, and is not so hungry as in cold weather. Any excess of food is more likely to upset him, and if the hot weather comes suddenly it is wise to cut down the quantity or strength of his food slightly, but he should have as much as he needs. Food that agreed with him before may upset him now, and advances in diet should be made cautiously. It is wise to wean babies in the cool months rather than in the hot months, though this is not always possible.

Every summer we have outbreaks of dysentery amongst our babies; no years are free from them. Dysentery is an entirely preventable disease. It is characterised by loose motions, containing blood and slime, often passed with much straining. There is rapid wasting and there may be high fever and great prostration. In many cases death ensues. It is sometimes called gastro-enteritis or summer diarrhoea, but its right name is dysentery. It is caused by dysentery bacilli, which are contained in the motions passed. Dysentery bacilli during epidemics are found also in the motions of many people who are only slightly indisposed or perhaps not ill at all. They may be conveyed by the mother's hands from the baby's napkins to the food of other children. From one house to another they are conveyed by flies which visit the closet-pans and infect the babies' food or the teats of their bottles or their dummies. Dysentery epidemics occur during the fly season.

The best preventive of dysentery is breast feeding. Flies cannot convey dysentery to the food of a breast-fed baby, but they are very fond of settling on the baby's dummy. The present fashion of using dummies and pinning them outside babies' frocks is a direct invitation to disease. It is exposing healthy babies to a serious risk of death. If a mother wishes to keep her baby safe from this dread disease she will put its dummy, if it has one, into the kitchen fire. If the baby is bottle-fed, she will take the utmost care to protect its food, its bottles, and teats, after scalding them, from flies. The lives of Queensland babies depend on the care taken by Queensland mothers. Are we to have any unnecessary babies' deaths this year? —Dr. A. TURNER, Director of Infant Welfare.

RAISING SEEDLINGS.

The soil for the seed-bed or seed-box is prepared by mixing good garden loam with sand. Such a soil holds moisture well, allows the young plants every opportunity of pushing their way to the surface, and encourages a large root development. Too rich a soil in the seed-bed or seed-box has a tendency to produce long, spindly plants, while if the soil sets hard it is quite unsuitable for its purpose, and where the garden loam used in the mixture gives it such an inclination more sand should be used.

The seed-box need not be more than 4 to 6 inches deep. It is important that drainage be allowed for, and although the chances of successful seed-raising are very remote without good drainage, the provision is one which beginners often neglect to make. Unless the bottom boards of the box are divided by a well-defined space, it will be necessary either to replace them by narrower ones or to bore holes in them with an auger, so that the water may have an easy get-away. Small openings between the bottom boards are of little use, as the swelling of the timber after watering may make the box practically watertight. The bottom of the seed-box should be spread with a layer of pieces of broken pots or small stones. Over this should be placed (if available) a layer of leaf mould, and finally the sandy loam mixture in which the seed is to be sown. The surface should be pressed down with a piece of board before sowings are made.

To sow small seeds, whether in boxes or in the garden bed, make very shallow drills—just slight depressions—across the surface of the soil and sprinkle the seed evenly along them. For light seeding the seed should be picked up between the finger and thumb and dropped with a slow rubbing movement. After sowing, shake a little prepared soil over the surface and again press down lightly with a block of wood.

The watering of the seed-box or seed-bed must at all times be carried out with care, so that the flattening of the plants and the washing of the soil from their roots may be prevented. The boxes should be on a level, so that the effects of watering may be uniform. Unless the rose of the watering-can is an extremely fine one, it is preferable to immerse the boxes in water in a suitable receptacle in which the water is deep enough to percolate upwards to the surface of the soil, but not so deep that water will lie actually on the surface of the soil. If the original seeding has been too thick the young plants should be thinned out or pricked off into other boxes. Pricking out into a second set of boxes or a seed-bed has the effect of producing well-rooted, stocky plants which can be transplanted ultimately into the open with the least risk of failure. The young seedlings should not be pricked out until they have thrown out their third leaf.

THE BEAUTIES OF NATURE.

The man whose mind is so "artificial" that he can see no wonder and beauty in a growing shoot or budding flower, and who cannot appreciate the charm and inspiration of a blossoming peach tree, or imbibe peace and calm from a soft emerald lawn, or glorious scented roses, is to be pitied—and mistrusted, since he is probably lacking in other vital human qualities. We need not all be philosophers or poets; but the beauties of Nature should stir the emotions and make us, like Wordsworth, unconsciously richer in mind—

"I saw a crowd,
A host of golden daffodils. . . .
I gazed—and gazed—but little thought
What wealth the show to me had brought:
For oft, when on my couch I lie
In vacant or in pensive mood,
They flash upon that inward eye
Which is the bliss of solitude;
And then my heart with pleasure fills,
And dances with the daffodils."

Moreover, in the lives of even the happiest and most carefree among us there are moments of depression and disillusion, when we crave solitude, and when the comforting words of a well-meaning friend would only serve to irritate and accentuate our gloominess and "blue" feeling.

At such times there is nothing more soothing and consoling than a garden, wherein we may potter about and forget our woes—

"Flowers are so exquisite and so silent."

Gardening, therefore, as a hobby is unequalled for "taking us out of ourselves." A garden requires constant attention—watering, weeding, digging, and sowing—but leaves us little time for moroseness or self-pitying introspection. As the writer, Richard King, has so aptly said—

"Gardening is the only hobby wherein a man is sufficient unto himself alone. Most other hobbies drag in at least one other person, either as critic, partner, or echo. But a man with a garden needs only faith and a seed catalogue."

The nature-lover is indeed never lonely. But to be a nature-lover does not imply knowing by rote the long scientific names of every weed and tree and plant or being able to judge with botanical accuracy the quantity of nitrogen which the roots of leguminous plants impart to the soil, and suchlike facts. It is well to know these, but not at the expense of simple delight and happiness. One need not become enthusiastic to the point of intellectual automatism! One can, without being able to name a single flower or bird or tree, be more sincerely a lover of Nature than the walking-guide-book-to-horticulture.

The true test is whether our spirit is gladdened by, and rejoices at, the simplicity of Nature. And what better way of appreciating this than by cultivating one's own garden plot? As someone has written, "Gardening must be God's hobby. It is the only hobby recreation with a 'soul' in it."—"Orchis" in the "South African Garden" and Country Life."

THE PLANTING AND CARE OF HEDGES.

When properly planted and kept in good order, a hedge is a great shelter and a lasting ornament to any place, and will add considerably to the value of a property.

It is advisable in this State to plant hedges on level ground, on account of the long spells of dry weather and the hot winds which prevail during the summer. Where the ground is swampy, however, it is necessary to form a bank or what is generally called a turf wall, two or three feet above the ground level, tapering on both sides, and about two feet broad on top. A line is run along the centre of the bank, and a little trench cut out, and the rooted cuttings are planted against the back of the trench, where the line is set. Where the turf has been removed to form the bank will now act as a drain.

The trench should be about 18 inches wide and a good spade deep. Some manure should be put in the bottom, and covered with a light layer of soil, and the plants placed up against the straight solid wall. The roots are covered with a little soil and well watered, and the trench filled up with the remainder of the soil. When this is done it is advisable to look along the row of plants to see if any are out of place. When the plants are made firm, cut them each to six or eight inches from the ground, and dig the ground for about three feet on each side of the hedge.

Hedges that are exposed to cattle must be fenced as soon as planted, either with a temporary stake and bush hedge, with hurdles, or with a light post and wire fence, for four or five years, till the hedge grows up, care being taken not to place the fence too close to the hedge. The hedge must also be duly weeded while young, especially during the first two years.

In order to preserve hedges in proper form, they must be clipped on the sides and tops at least once a year, and, if possible, oftener. The best time for the first cut is midsummer, with the second cut in April or May. The shoots should always be cut the same season while in leaf, and before they become hard. The work may thus be performed more expeditiously and with greater exactness, as the cutting should be as even as a wall on the sides, and the top as straight as a line. After the hedge is formed to its proper width, the growth should be cut as nearly as possible to that of the former cut, particularly on the sides. It should never be allowed to grow more than a foot or 18 inches wide, or too much on the top.

When the cutting cannot be carried out more than once in the year, the clipping should not be performed until the end of April or May in this State, for if cut sooner it will shoot again, and appear almost as rough all the winter as if it had not been touched.

High hedges are very troublesome and expensive to keep in proper order.

BUDDING FRUIT TREES—NO TIME LIKE THE PRESENT.

The present month is likely to be most suitable for budding both old trees and nursery stock. Old trees which were cut back at the end of the winter with a view to being worked in the summer should by this time have made quite sufficient mature young shoots to bud into. It is by far the best policy to work many more of these young shoots than will be required for the ultimate formation of the new tree, as there is likely to be some loss from heavy winds and other causes. Moreover, the leaf surface of the tree is very much reduced by the cutting back in the winter, and it is to the benefit of the tree to allow as much new foliage to grow as possible. The development of shoots from several points round thick stumps keeps the bark healthy all round, whereas if only a few shoots spring from one side the bark often dies away on the other side. The thinning out of superfluous shoots can be spread over several years.

There are three seasons—spring, summer, and autumn—when budding can be carried out, but autumn finds most favour with nurserymen for budding citrus trees. The operation is best carried out on fine days, avoiding wet days.

Insert the buds in the young stock about 4 to 6 inches above the ground, but when old trees are being worked over the buds may be inserted in the branches close to the trunk of the tree, and just where a limb is required. This will give the tree a good shape. It is generally found best to put the bud on the under side rather than on the top side of the limb, as, by inserting the bud on the top

of the limb in an old tree, the growth tends to be all inwards, thus unduly crowding the centre of the tree.

Medium-sized shoots afford the best buds, and well-developed buds are the best to use. The buds towards the top of a shoot are not usually well-developed, and those near the base are, as a rule, also small and poorly developed; and, while they might grow all right, the chances are they will not make such fruitful trees as those grown from buds which are large and well-matured, and which have clustered around them two or more fruit buds. This applies more particularly to peaches, apricots, nectarines, and plums.

As soon as the bud stick is cut from the tree, the leaves should be cut off just close to the bud, and the quicker the latter is inserted the better. This, together with tight wrapping, is the reason why men accustomed to the work have better success than amateurs, as they never mutilate a bud when cutting it, and from the time it is cut until it is inserted is only a matter of a few seconds. It is a good idea to carry the bud stick wrapped in wet sacking during hot weather to keep it from wilting and spoiling.

To make the cut in the stock, preparatory to inserting the bud, take a *sharp* budding knife and make a vertical cut from 1 to 1½ inches in length, then a horizontal cut directly across the top of the first cut, allowing the knife to press back, so that the bark is cut and slightly raised with the one operation. If the sap is flowing freely these two cuts extending through the bark are all that is required. As the bud will have to be slipped downwards into this cut, we must cut the bud from the bud stick by commencing the cut below the bud and finishing above it. This leaves the bottom portion of the bud in a very smooth condition, and allows it to keep its shape while being forced underneath the bark of the stock. It will be observed that the bark has not been loosened, except when making the horizontal cut, and then only sufficiently to allow the lower point of the bud to enter the bark, preparatory to being forced down with either knife or thumb.

To cut the bud from the bud stick, insert the knife half an inch below the bud, cutting through the bark into the wood, pass the knife under the bud and bring it out half an inch above it, thus severing the bud with a thin slice of wood adhering to it. The bud is now placed in the top of the cut made on the stock and forced down with the thumb or the blade of the budding knife. The bud is now ready to be tied, and if raffia is used it should be moistened before being used.

Care must be taken to see that the bud is tightly wrapped and securely fastened, for if the wrapping becomes loose the chances are the bud will not take. The bud will not be damaged even if it is completely covered by the wrapping, but if it is large it is as well to leave it slightly exposed. If there is any reason to expect rain about budding time, it is best to use a waxed cloth, and by starting the wrap from below the bud and finishing at the top it can be so wrapped that very little moisture will find its way underneath the waxed cloth.

CAPE GOOSEBERRIES.

When making the tomato bed and sowing seed, sow also the cape gooseberry. The cape gooseberry is a member of the same family group as the tomato, and the treatment that suits one suits the other. The plants like a fairly light soil, which has been well manured with either thoroughly rotted cow manure or well treated with meatworks manure and superphosphate. When the young plants are put in they should be well firmed into the ground, and given a good watering. It may be desirable, for a day or two, to give them a little shade. One who has had great success with the cape gooseberry recommends the following treatment:—"Although the cape gooseberry is a perennial, I find that it does best with us in Queensland when treated as an annual. It fruits very heavily in its first season, and I think far more heavily than in subsequent seasons. I like to sow the seed in large pots of fairly rich soil, though the soil must be light. The seed is quite big enough to let me put out each seed separately, and in that way I am able to ensure that the young plants are not crowded together. I sow the seed, water it, and then stretch a piece of white paper right over the pot. I put this pot out in the sun. It is not many days before the seeds show signs of breaking through the soil. I then remove the paper covering, and all I have to do is to see that the soil is kept moist. The plants grow very quickly, and as soon as they develop their second pair of leaves I put them out in the beds where they are to grow. I have a neighbour who, being an Englishman, and an old-time gardener, pricks his seedlings out. That is to say, after removing them from the seed pot he puts them into a small pot, and lets them develop in that pot before he transfers them, soil and all, into the bed. I think he probably has better results than I have, but then he has a lot more work."

1 FEB., 1929.] QUEENSLAND AGRICULTURAL JOURNAL.

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Orchard Notes for March.

THE COASTAL DISTRICTS.

If the weather is favourable, all orchards, plantations, and vineyards should be cleaned up, and the ground brought into a good state of tilth so as to enable it to retain the necessary moisture for the proper development of trees or plants. As the wet season is frequently followed by dry autumn weather, this attention is important.

Banana plantations must be kept free from weeds, and suckering must be rigorously carried out, as there is no greater cause of injury to a banana plantation than neglect to cultivate. Good strong suckers will give good bunches of good fruit, whereas a lot of weedy overcrowded suckers will only give small bunches of under-sized fruit that is hard to dispose of, even at a low price.

Cooler weather may tend to improve the carrying qualities of the fruit, but care must still be taken to see that it is not allowed to become over-developed before it is packed, otherwise it may arrive at its destination in an over-ripe and consequently unsaleable condition. The greatest care should be taken in grading and packing fruit. Only one size of fruit of even quality must be packed. Smaller or inferior fruit must never be packed with good large fruit, but must always be packed separately as required by regulation.

The marketing of the main crop of pineapples, both for canning and the fresh fruit trade, will be completed in the course of the month, and as soon as the fruit is disposed of plantations which are apt to become somewhat dirty during the gathering of the crop must be cleaned up. All weeds must be destroyed, and if blady grass has got hold anywhere it must be eradicated, even though a number of pineapple plants have to be sacrificed, for once a plantation becomes infested with this weed it takes possession and soon kills the crop. In addition to destroying all weed growth, the land should be well worked and brought into a state of thorough tilth.

In the Central and Northern districts, early varieties of the main crop of citrus fruits will ripen towards the end of the month. They will not be fully coloured, but they can be marketed as soon as they have developed sufficient sugar to be palatable; they should not be gathered whilst still sour and green. Citrus fruits of all kinds require the most careful handling, as a bruised fruit is a spoilt fruit, and is very liable to speck or rot. The fungus that causes specking cannot injure any fruit unless the skin is first injured. Fruit with perfect skin will eventually shrivel, but will not speck. Specking or blue mould can therefore be guarded against by the exercise of great care in handling and packing. At the same time, some fruit is always liable to become injured, either by mechanical means, such as thorn pricks, wind action, hail, punctures by sucking insects, fruit flies, the spotted peach moth, or gnawing insects injuring the skin. Any one of these injuries makes it easy for the spores of the fungus to enter the fruit and germinate. All such fruit must therefore be gathered and destroyed, and so minimise the risk of infection. When specked fruit is allowed to lie about in the orchard or to hang on the trees, or when it is left in the packing sheds, it is a constant source of danger, as millions of spores are produced by it. These spores are carried by the wind in every direction, and are ready to establish themselves whenever they come in contact with any fruit into which they can penetrate. Specking is accountable for a large percentage of loss frequently experienced in sending citrus fruits to the Southern States, especially early in the season, and as it can be largely prevented by the exercise of necessary care and attention, growers are urged not to neglect these important measures.

Fruit must be carefully graded for size and colour, and only one size of fruit of one quality should be packed in one case. The flat bushel-case (long packer) commonly used for citrus fruits does not lend itself to up-to-date methods of grading and packing, and we have yet to find a better case than the American orange case recommended by the writer when he came to this country from California in 1892, and which has again proved its superiority in the recent shipments of oranges from the Southern States to England. Failing this case, a bushel-case suggested by the New South Wales Department of Agriculture is, in the writer's opinion, the most suitable for citrus fruits, and were it adopted it would be a simple matter to standardise the grades of our citrus fruit, as has been done in respect to apples packed in the standard bushel-case used generally for apples throughout the Commonwealth. The inside measurements of the case suggested are 18 in. long, 11½ in. wide, and 10½ in. deep. This case has a capacity of 2,200 cubic inches, but is not included in the schedule of the regulations under "*The Fruit Cases Acts, 1912-1922.*" The

half-bushel case, No. 6 of the Schedule above referred to, is 10 in. by 11½ in. by 5½ in. inside measurements with a capacity of 1,100 cubic inches. The case should be suitable for oranges and the half-case for mandarins. No matter which case is used, the fruit must be sweated for seven days before it is sent to the Southern markets, in order to determine what fruit has been attacked by fruit fly, and also to enable bruised or injured fruit liable to speck to be removed prior to despatch.

Fruit fly must be systematically fought in all orchards, for if this important work is neglected there is always a very great risk of this pest causing serious loss to citrus growers.

The spotted peach moth frequently causes serious loss, especially in the case of navels. It can be treated in a similar manner to the codlin moth of pip fruit, by spraying with arsenate of lead, but an even better remedy is not to grow any corn or other crop that harbours this pest in or near the orchard. Large sucking-moths also damage the ripening fruit. They are easily attracted by very ripe bananas or by a water-melon cut in pieces, and can be caught or destroyed by a flare or torch when feeding on these trap fruits. If this method of destruction is followed up for a few nights, the moth will soon be thinned out.

Strawberry planting can be continued during the month, and the advice given in last month's notes still holds good. Remember that no crop gives a better return for extra care and attention in the preparation of the land and for generous manuring than the strawberry.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The advice given in these notes for the last few months regarding the handling, grading, and packing of fruit should still be carefully followed. The latter varieties of apples and other fruits are much better keepers than earlier-ripening sorts, and as they can be sent to comparatively distant markets, the necessity for very careful grading and packing is, if anything, greater than it is in the case of fruit sent to nearby markets for immediate consumption. Instruction in the most up-to-date methods of grading and packing fruit has been published by the Department, which advice and instruction should enable the growers in that district to market their produce in a much more attractive form.

The same care is necessary in the packing of grapes, and it is pleasing to note that some growers are packing their fruit very well. Those who are not so expert cannot do better than follow the methods of the most successful packers.

As soon as the crop of fruit has been disposed of, the orchard should be cleaned up, and the land worked. If this is done, many of the fruit-fly pupæ that are in the soil will be exposed to destruction in large numbers by birds, or by ants and other insects. If the ground is not worked and is covered with weed growth, there is little chance of the pupæ being destroyed.

Where citrus trees show signs of requiring water, they should be given an irrigation during the month, but if the fruit is well developed and approaching the ripening stage, it is not advisable to do more than keep the ground in a thorough state of tilth, unless the trees are suffering badly, as too much water is apt to produce a large, puffy fruit of poor quality and a bad shipper. A light irrigation is therefore all that is necessary in this case, especially if the orchard has been given the attention recommended in these notes from month to month.

Farm Notes for March.

Land on which it is intended to plant winter cereals should be in a forward stage of preparation. Sowings of lucerne may be made at the latter end of the month on land which is free from weed growth and has been previously well prepared.

The March-April planting season has much in its favour, not the least of which is that weeds will not make such vigorous growth during the succeeding few months, and, as a consequence, the young lucerne plants will have an excellent opportunity of becoming well established.

Potato crops should be showing above ground, and should be well cultivated to keep the surface soil in good condition; also to destroy any weed growth.

In districts where blight has previously existed, or where there is the slightest possible chance of its appearing, preventive methods should be adopted—i.e., spraying with "Burgundy mixture"—when the plants are a few inches high and have formed the leaves; to be followed by a second, and, if necessary, a third spraying before the flowering stage is reached.

Maize crops which have fully ripened should be picked as soon as possible and the ears stored in well-ventilated corn cribs, or barns. Selected grain which is intended for future seed supplies should be well fumigated for twenty-four hours and subsequently aerated and stored in airtight containers. Weevils are usually very prevalent in the field at this time of the year and do considerable damage to the grain when in the husk.

The following crops for pig feed may be sown:—Mangel, sugar beet, turnips and swedes, rape, field cabbage, and carrots. Owing to the small nature of the seeds, the land should be worked up to a fine tilth before planting, and should contain ample moisture in the surface soil to ensure a good germination. Particular attention should be paid to all weed growth during the early stages of growth of the young plants.

As regular supplies of succulent fodder are essentials of success in dairying operations, consideration should be given to a definite cropping system throughout the autumn and winter, and to the preparation and manuring of the land well in advance of the periods allotted for the successive sowings of seed.

The early planted cotton crops should be now ready for picking. This should not be done while there is any moisture on the bolls, either from showers or dew. Packed cotton showing any trace of dampness should be exposed to the sun for a few hours on tarpaulins, bags, or hessian sheets, before storage in bulk or bagging or baling for ginning. Sowings of prairie grass and *phalaris bulbosa* (Toowoomba canary grass) may be made this month. Both are excellent winter grasses. Prairie grass does particularly well on scrub soil.

Dairymen who have maize crops which were too far advanced to benefit by the recent rains, and which show no promise of returning satisfactory yields of grain, would be well advised to convert these into ensilage to be used for winter feed. This, especially when fed in conjunction with lucerne or cowpea, is a valuable fodder. Where crops of Soudan grass, sorghum, white panicum, Japanese millet, and liberty millet have reached a suitable stage for converting into ensilage, it will be found that this method of conserving them has much to recommend it. Stacking with a framework of poles, and well weighting the fodder, is necessary for best results. All stacks should be protected from rain by topping off with a good covering of bush hay built to a full eave and held in position by means of weighted wires.



Photo.: Jean Easton.]

PLATE 64.

Shaded Silences.—A Peaceful Pool on Coochin Coochin.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.**AT WARWICK.****MOONRISE.**

| Date. | February, 1929. | | March, 1929. | | Feb. 1929. | Mar., 1929. |
|-------|-----------------|-------|--------------|-------|------------|-------------|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| 1 | 5.26 | 6.46 | 5.46 | 6.24 | p.m. 11.14 | p.m. 9.45 |
| 2 | 5.26 | 6.45 | 5.47 | 6.23 | 11.47 | 10.20 |
| 3 | 5.27 | 6.45 | 5.48 | 6.22 | 0.0 | 11.0 |
| 4 | 5.28 | 6.44 | 5.48 | 6.21 | 12.23 | 11.46 |
| 5 | 5.28 | 6.44 | 5.49 | 6.20 | 1.5 | 0.0 |
| 6 | 5.29 | 6.43 | 5.49 | 6.19 | 1.53 | 12.34 |
| 7 | 5.30 | 6.42 | 5.50 | 6.17 | 2.43 | 1.28 |
| 8 | 5.31 | 6.42 | 5.50 | 6.16 | 3.37 | 2.22 |
| 9 | 5.31 | 6.41 | 5.51 | 6.15 | 4.32 | 3.29 |
| 10 | 5.32 | 6.40 | 5.51 | 6.14 | 5.31 | 4.20 |
| 11 | 5.33 | 6.40 | 5.52 | 6.13 | 6.32 | 5.20 |
| 12 | 5.34 | 6.39 | 5.52 | 6.12 | 7.31 | 6.20 |
| 13 | 5.34 | 6.38 | 5.53 | 6.11 | 8.29 | 7.19 |
| 14 | 5.35 | 6.37 | 5.54 | 6.10 | 9.27 | 8.20 |
| 15 | 5.36 | 6.37 | 5.55 | 6.9 | 10.27 | 9.23 |
| 16 | 5.36 | 6.36 | 5.55 | 6.7 | 11.30 | 10.29 |
| 17 | 5.37 | 6.35 | 5.56 | 6.6 | 12.37 | 11.38 |
| 18 | 5.38 | 6.34 | 5.57 | 6.5 | 1.44 | 12.42 |
| 19 | 5.38 | 6.34 | 5.57 | 6.4 | 2.49 | 1.44 |
| 20 | 5.39 | 6.33 | 5.58 | 6.3 | 3.52 | 2.44 |
| 21 | 5.40 | 6.32 | 5.58 | 6.2 | 4.51 | 3.38 |
| 22 | 5.40 | 6.31 | 5.59 | 6.0 | 5.43 | 4.25 |
| 23 | 5.41 | 6.30 | 5.59 | 5.59 | 6.26 | 5.4 |
| 24 | 5.42 | 6.29 | 6.0 | 5.58 | 7.2 | 5.36 |
| 25 | 5.42 | 6.28 | 6.0 | 5.57 | 7.37 | 6.13 |
| 26 | 5.43 | 6.27 | 6.1 | 5.56 | 8.9 | 6.39 |
| 27 | 5.44 | 6.26 | 6.1 | 5.55 | 8.40 | 7.10 |
| 28 | 5.44 | 6.25 | 6.2 | 5.53 | 9.11 | 7.42 |
| 29 | | | 6.2 | 5.52 | | 8.16 |
| 30 | | | 6.3 | 5.51 | | 8.54 |
| 31 | | | 6.3 | 5.50 | | 9.38 |

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | | |
|--------|---|---------------|------------|
| 2 Feb. |) | Last Quarter | 12 10 a.m. |
| 10 " | ● | New Moon | 3 55 a.m. |
| 17 " | (| First Quarter | 10 22 a.m. |
| 24 " |) | Full Moon | 4 58 a.m. |

Apogee, 4th February, at 6 30 p.m.
Perigee, 20th February, at 4 30 p.m.

As the Sun will be apparently amongst the stars of Capricornus from the 1st to the 17th that constellation will be on the western horizon at sunset, and the arch of zodiacal constellations, stretching from east to west at 8 p.m., will be:—Aquarius, Pisces, Aries, Taurus, Gemini and Cancer. At the end of the month, at 8 p.m., Aquarius will have disappeared in the west and Leo come into view on the eastern horizon.

The Southern Cross will rise early in the evening in the south-east with head bent slightly downwards; but at 10 p.m. on the 1st, and at 8 p.m. on the 28th, it will be in a horizontal position.

Mercury will be passing from the east to the west side of the Sun on the 7th, with its dark side to the earth; later on in the month it will be visible in crescent-shape (in a telescope) before sunrise.

Venus will reach its greatest distance east of the Sun, 47 degrees, on the 7th, when it will set about 8.55 p.m. This brilliant planet and the crescent Moon will grace the western sky, about 9 degrees above the great Square of Pegasus, early in the evening on the 13th.

The occultation of Jupiter by the Moon on the 15th between 5 and 6 p.m., though occurring in daylight, will be an interesting event. The time of Jupiter's disappearance will depend upon the position of the observer, and will be earlier in the southern parts of Queensland than in the northern.

Mercury will set 29 minutes after the Sun on the 1st, with the Sun on the 7th and on the 14th at 5.38 p.m.

Venus will set at 9.6 p.m. on the 1st and at 8.45 p.m. on the 14th.

Mars will rise at 10.40 p.m. and set at 8.48 a.m. on the 1st. On the 14th it will rise at 10.53 p.m. and set at 9.3 a.m.

Jupiter will rise at 11.34 a.m. and set at 10.50 p.m. on the 1st. On the 14th it will rise at 10.49 a.m. and set at 10.3 p.m.

Saturn will rise at 2.4 a.m. and set at 3.40 p.m. on the 1st. On the 14th it will rise at 1.18 a.m. and set at 2.58 p.m.

| | | | |
|--------|---|---------------|-----------|
| 3 Mar. |) | Last Quarter | 9 9 p.m. |
| 11 " | ● | New Moon | 6 36 p.m. |
| 18 " | (| First Quarter | 5 41 p.m. |
| 25 " |) | Full Moon | 5 46 p.m. |

Apogee, 4th March, at 2.54 p.m.
Perigee, 18th March, at 12.24 a.m.

Mercury will be at its greatest distance, 27 degrees west of the Sun, on the 4th. It will, therefore, be a morning star rising at 3.47 a.m.

The Moon will be passing Saturn about 8 a.m. on the 5th when Saturn will be about 8 diameters of the Moon below or northward of it. It will also pass Mercury at the same apparent distance on the 9th before midday.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 20 minutes; at Thargomindah, 26 minutes; and at Oontoo, 32 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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19. APR. 1929

A. R. J. PUS

QUEENSLAND AGRICULTURAL JOURNAL

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1 MARCH, 1929.

PART 3.

Event and Comment.

Banana Grade Standards—Efficiency in Industry.

"I HAVE a responsibility as Minister for Agriculture to the people of Queensland, and that is to see that our primary industries are developed and placed on the most efficient basis possible." That was the text on which Mr. Forgan Smith based a strong reply to a deputation representative of Queensland banana growers, and which recently discussed with him certain matters relating to the enforcement of the new grade standards for bananas. Continuing, the Minister said, *inter alia*, that Australia is definitely a nation that has adopted high standards of living. The inevitable corollary of that was high standards of efficiency in all sections of industry. In short, they could not maintain a white man's standard on faulty methods of cultivation or production in industry. That fact was apparent to every investigator and any one with only an elementary knowledge of economics. The banana industry was one that particularly engaged their attention in Queensland. It was suitable to their climatic and soil conditions in different portions of the State. It was an industry peculiarly suited to closer settlement—a very important thing in a State like Queensland—and, because of that, it was necessary to build it up and foster it in every reasonable way. The Government of the Commonwealth had agreed with those principles and had imposed a tariff amounting to an embargo against bananas grown outside of Australia. That protection was of great benefit, enabling the Queensland industry to be carried on under the white man's standards of which they all approved. With protection of an industry, a responsibility was cast upon those engaged in that industry to do their part in justice to the rest of the people of Australia. In other words, a protected industry, for which the tariff impost was adequate, owed an obligation to the people of the Commonwealth to

supply them with a commodity high in quality and of sufficient quantity to meet their demands. That positive statement of the position could not be combated by any reasonable citizen. By means of the Banana Cultivation Act they had endeavoured to keep the cultivation of the banana in the hands of their own people; and as a result of that legislation and the Federal fiscal policy the banana industry had expanded. The degree of their success in banana production might vary with climatic or soil conditions, or as between individual and individual, but, generally speaking, banana growing in Queensland had expanded as a result of the policy to which he had referred. Unfortunately, in the course of the last year or two, the industry had faced many difficulties due to disease and other causes. Certain areas, where formerly fruit of high quality had been produced, had gone out of cultivation, only temporarily it was hoped, on account of bunchy-top infestation. In other cases, owing to the selection and cultivation of unsuitable land, or to faulty methods of cultivation, a fruit of lower than average quality had been produced and offered for sale, and, as a consequence, a serious agitation had developed in the Southern States which provided their chief markets. No trade could be placed on a permanently satisfactory basis unless that business was carried on with a reasonable degree of efficiency. As a result of communications received by the Government, investigations into the position had been made in the South. He had personally investigated the matter and had come to the conclusion, on the evidence he had seen himself and on the evidence placed before him by officers of the several Departments of Agriculture whose duty it was to see to those things, that the banana industry was being seriously menaced by a certain section of growers who were seriously retarding the progress of the whole industry. While he remained a member of the Government he would not allow a small percentage of growers to depreciate the value of that industry to the State and neutralise efforts made to win and maintain for it satisfactory markets. Seventy-five per cent. of the bananas going to the South were of quite good quality, but the remaining 25 per cent. left very much to be desired. He had been shown cases of bananas graded in a manner that was no indication of the contents of the case at all, fruit of all sizes being packed in one case, and in others fruit too small in size to be of any marketable value.

The Minister went on to particularise other cases of faulty grading and wrong description of consignments, and made some illuminative observations on some of the ripening methods in vogue in the South.

Queensland Bananas in the South.

IN the course of his inquiries in the southern capitals, Mr. Forgan Smith informed the deputation, he found Queensland bananas of high quality being sold as the product of Fijian plantations. The best bananas he saw in Melbourne came from the Byfield district in Central Queensland, and they were being exhibited in fruiterers' windows as Fiji bananas. On inquiry, the explanation was that they were of the type that were formerly procured from Fiji. One vendor put it rather humorously to him. "We are not," he said, "contending they were grown in Fiji but they are of the type or quality of Fiji bananas—just, for example, as Scotch shortbread is sold on the market, but is not claimed to be made in Edinburgh." However, it was interesting to note that bananas of good size and quality brought a ready market. The Byfield bananas to which he had referred were being readily retailed at 3d. each. The fruiterers told him that there was no limit to the quantity of that type that could be sold. There was a greater demand and a better price offering for the large fruit. All the things that he had mentioned indicated the necessity for immediate action in placing their marketing arrangements on a much more satisfactory basis. It was the responsibility of the Government of the State to see that no section of an industry was allowed to injure its whole trade or destroy one of the important sources of wealth production in Queensland. In addition, attempts had been made to market fruit that was of no quality at all. They saw on his table some rejected bananas offered since the Regulations came into force,

marked as "special" and "standard" that were not of the quality of any of the grades admitted to be adequate or fair. The exhibits were a fair indication of the average of the contents of the cases from which they had been taken. Having regard to the position as he saw it in the Southern States, and having regard to the quality of the bananas that were grown and could be grown in Queensland, it did not appear to him that the prescribed standards were unduly high if they desired to keep their markets and extend them on a satisfactory basis.

Queensland Grades Accepted.

ALL the States of Australia to which Queensland bananas have gone, said Mr. Forgan Smith, have approved and accepted the proposals made by the Queensland Government. The New South Wales Government had even queried them on the ground that they were not drastic enough. However, the Southern Departments were prepared to give the Regulations a fair trial with a view to placing the industry on a satisfactory footing. It was his view that those Regulations should be given a fair trial, and that growers should endeavour to co-operate wholeheartedly with the Department to that end. It was his intention to recommend to the Government the introduction of a Bill in the next session of Parliament to deal more adequately with many other phases of the banana industry, the necessity for which had recently become so apparent. If it were necessary to reconsider the question of Regulations later on, it could be done when that Bill was before the Legislature. It was his desire and intention to recommend an amendment of the Banana Cultivation Act which would deal with the cultivation of bananas, the diseases to which the fruit was subject, and other related matters.

The Machine on the Farm.

THE coming tractor school at the Queensland Agricultural High School and College will serve, in addition to its other advantages, as an excellent illustration of the development of agricultural implements and machinery to meet the changes that are taking place in country conditions in Australia. The mechanisation of agriculture is proceeding apace, providing a ready means of adjusting high and rising costs of production. Though the engineer has not completely solved our agricultural problems, nor is he likely to, yet to his ingenuity we are indebted greatly for much of our progress towards that end.

The economic utility of the modern tractor with its speed and power is a case in point. Half the job in farming is to be able to get on to the land when weather and soil conditions are suitable and have the ploughing done as quickly as possible, and that is where the tractor proves its great advantage. Present developments in tractor design are in the direction of evolving a dual purpose type that will be as useful on the road as in the field.

Machinery, where its use is an economical proposition, is also helping to reduce the cost of harvesting and numerous other field operations. On the dairy farm mechanical milking is to-day vastly different from what it was even ten years ago; and improved types of machinery are now available which are not only efficient in their work as labour savers, but also ensure cleanliness in the product equal to that obtainable by the most hygienic manual methods.

The success of mechanised agriculture is, as in other things, made or marred by the human element, and that this fact is widely recognised is evident by the stress now laid on the importance of agricultural engineering in college courses. The power plant is now an indispensable unit of most farming outfits, and the mechanic is a new addition to skilled farm and station labour. In the world to-day there is an ever-widening field of opportunity before those who have a mechanical bent, and it is stimulating to see the extent to which the machine on the farm is engaging the attention of engineering genius. It is also good to observe the keen enthusiasm of the staff of the Queensland Agricultural High School and College in providing opportunities for farmers to study and use, under actual field conditions, the newest types of tractors and other modern agricultural machinery.

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

Too Late for Fumigating Cane Grubs.

Little or no opportunity for fumigating grub-infested land is likely to occur during this month (March), on account of advanced growth of the cane, which in most places has now become high enough to meet overhead between the rows, and by shutting out the sunlight, to prevent speedy evaporation of moisture from the soil. After commencement of the wet season it generally happens that successive heavy showers render such shaded land too wet for effective treatment, since the interstices or tiny air spaces between the soil particles remain continually filled with surplus water which has little chance of draining away or being removed by a brisk evaporation.

On very well-drained high lands of volcanic origin and excellent soil porosity it may still be possible to use paradichlorobenzene effectively on third-stage grubs of *Lepidoderma albobirtum* Waterh. before they have had time to seriously injure or kill certain stands of late-planted cane.

Prepare to Fight "Army Caterpillars."

Larvæ of our various species of Army or Grass Worms may suddenly invade canefields this month in more or less formidable numbers; so that it is well to be ready to meet any attack that may happen to demand prompt repressive action.

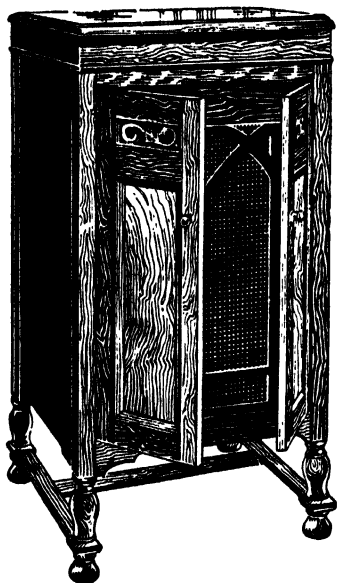
When an army of caterpillars chances to assume vast dimensions, it becomes advisable to at once communicate with the Entomologist at Meringa Experiment Station.

Ordinary outbreaks, however, can generally be effectively controlled by spraying the cane leaves with lead arsenate, in such manner as to form a poisoned strip or band of about three cane rows wide immediately in front of the line of advance taken up by the caterpillars. Use 2 lb. of lead arsenate in about 50 gallons of water; taking care to keep the mixture well agitated whilst spraying it over the leaves, in order to ensure and maintain uniform suspension of chemical in the water. Either of the following spray pumps will be found useful for such work; and no large cane farm should be without some such appliance—the "Rosebery" Hand Sprayer, No. 502, Buzacott and Company, Ltd., Brisbane and Sydney; Compressed air "Knapsack" Sprayers, Smellie and Company, Brisbane, &c.

Trapping Beetle Borers.

Amongst the various artificial methods practised for controlling the numerical increase of the weevil borer *Rhabdoenemis obscurus* Boisd., that of trapping the adult beetles deserves special mention, as being one of the simplest and at the same time most effective; one which costs nothing and is within the reach of every canegrower.

As already pointed out by us in different reports, a bait-trap of this kind consists merely of about twenty or more pieces of soft juicy cane stick about a foot long, split in half lengthwise and laid side by side in a compact heap with the cut surfaces downwards. These little heaps are placed at distances of about three chains apart along the headland of an affected field, under shade of the stools forming the edge of the cane block. They should be kept covered over with enough trash to exclude daylight and prevent the split cane from drying too quickly. These bait-traps should be visited every second day, and after collecting the weevils found in them the sticks must be replaced and covered over as before.



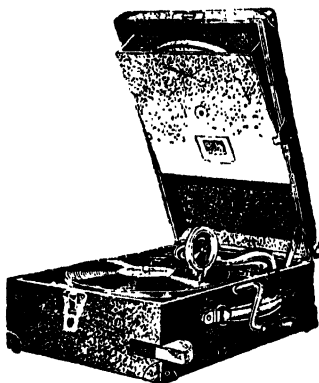
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CANE PESTS AND DISEASES.

Mr. R. W. Mungomery, Assistant Entomologist, Bundaberg, has submitted the following report for the period January-February, 1929, to the Bureau of Sugar Experiment Stations:—

A New Sugar Cane Insect Pest (*Crambus malacellus* Duponcel.).

Recent scoutings for insect pests in the Isis district have revealed the existence of a new lepidopterous cane pest, which, hitherto, had not come before our notice. This new lepidopteron was found by Mr. G. Bates when investigating an outbreak of army worms in the Kowbi area during December last, when several "dead hearts" were noticed amongst the cane damaged by the latter pests. The insect under consideration is a caterpillar borer which eats into the central heart of the young cane shoots, causing the "dead hearts" formerly referred to. The damage resembles that caused by the Noctuid moth borer (*Phragmatiphila truncata* Walk.) in young cane, but the caterpillars differ noticeably in their structure and habits. Specimens were accordingly collected and bred to the moth stage, and Dr. Jefferis Turner, to whom the specimens were sent for determination, has kindly identified them as *Crambus malacellus* Dup. This moth belongs to the family Crambidae, a group commonly known as "grass moths," and it is of interest to note that several important pests in other countries are contained in this family. In this connection might be mentioned the borer *Diatraea saccharalis* Fabr. of Louisiana, and *Chilo simplex* of India, both of which are representatives of this family and important cane pests in their respective countries, whilst several species of the genus *Crambus* are destructive to corn and grassland in North America.

In the area infested by this pest, young Badila ratoons were found to be damaged, shoots as small as 2 inches in height as well as larger ones up to 12 and 18 inches being injured. The larvæ have the peculiar habit of constructing silken galleries out of particles of earth, vegetable matter, and other debris which is webbed together, and from this vantage point, they eat right through into the central heart of the shoot. From this habit they have earned for themselves the name of "web-worms." Injury to the plant usually takes place on a level with the ground surface, but occasionally it is either a little above or below this point. Damage was estimated at about 1 per cent. of the total number of shoots in the infested field, but since all the shoots in a stool do not come to maturity, the real damage must be considerably below this figure.

General Description of the Various Stages of the Insect.

The larva or caterpillar is cylindrical and when full grown measures $\frac{3}{4}$ to $\frac{5}{8}$ inches in length (1.5 cms.). The head is of a pale yellowish-brown colour, with slightly darker irregular markings or blotches towards the vertex and sides. The cervical shield is darker than any other portion of the body, being a dirty black on the dorsal area and fading off gradually towards the lateral margins. The body is whitish, each segment bearing two rows of slightly raised dark spots or tubercles, which give the appearance of two interrupted transverse bands running from each side across the back, the anterior row of spots being larger than the posterior row. Each tubercle usually bears one seta or hair. The larva pupates in the soil within a silken web similar to that used as a retreat when eating into the cane shoot.

The pupa is about $\frac{1}{8}$ of an inch in length, being coloured pale brown. For some time prior to the emergence of the adult, the eyes begin to get darker, and immediately before, the darker pigment of the wings also becomes noticeable.

The moth is a small whitish species, with a wing expanse of $\frac{5}{8}$ to $\frac{3}{4}$ of an inch, the forewings bearing two pairs of silver longitudinal stripes. A small stripe runs along the costal margin broadening out as it approaches the tip, near which it is interrupted by four white lines intruding fanwise into the silver area. Parallel with this costal stripe is another which runs through the centre of the wing and which also widens slightly towards the outer margin. Between these two stripes, running parallel and near to the outer margin, is a thin silver band. A darkening is also visible on the inner margin of the wing.

The hind wings are white and semi-transparent, with a faint darkening along the outer margin and following the veins for a short distance inwards. The body is white with silver markings on the thorax near the junction of the wings, and the palpi which are large and snout-like, have their outer surfaces edged with silver.

Similar species of moths are frequently abundant in grassland and when disturbed fly in erratic short flights. When they alight, they are usually found resting along the length of a twig or grass shoot with their wings closely folded round their bodies. This gives them a cylindrical appearance and renders them less conspicuous.

Distribution and Economic Position.

The species *C. malacellus* Dup. is widely distributed, being found in such countries as New Guinea, Borneo, India, Africa, and Europe, whilst it has also been known in Australia for a considerable time, records extending from Sydney to as far north as Cooktown. Most likely it is indigenous to this country, and in addition to sugar cane, it probably feeds on various grasses. With reference to its economic position in sugar cane entomology, it is unlikely that this insect will ever be anything but a minor cane pest. This view is supported by the fact that this insect has been known to occur here for some time past, but up to the present time it has not been known to occasion any more than a little local damage, which is almost negligible. It therefore, appears to be kept under efficient control by several natural enemies, which prey on or parasitise caterpillars and moths. Also, although it occurs in other countries where sugar-cane grows, it has never been reported as causing injury to that crop.

CANE PEST COMBAT AND CONTROL.

Mr. E. Jarvis, Entomologist to the Bureau of Sugar Experiment Stations, has submitted the following report on some of the activities of the Meringa Experiment Station during the period January to February, 1929:—

Preventing Oviposition of "Greyback" Cockchafer

The advisability of attempting to deter egg-laden "greyback" beetles from ovipositing in canefields was pointed out by the present writer about thirteen years ago (1915), although it was not until six years later (1921) that initial field experiments in this connection were commenced on the "Carrah Estate," near Meringa. The various deterrents tested at that time, with a view to inducing cane beetles to avoid such treated areas, were—coal tar, naphthalene, chloride of lime, tobacco dust, and carbolineum emulsion; each experiment plot consisting of one-eighth of an acre, and being separated by suitable check areas. To avoid labour of emulsifying and spraying, the tar was prepared by mixing the quantity needed (2 gallons = 16 gallons per acre) with five kerosene tins full of dry sifted soil, so that the deterrent could be easily sprinkled in a semi-dry condition on each side of and between the cane stools, in a strip about 3 feet wide.

When examined twelve days later (0.15 inches of rain having fallen during this interval) the tarry odour was quite pronounced, and even after twenty-six days remained perceptible, although, perhaps, not sufficiently so to be repellent. The chloride of lime—which was also mixed with soil, and applied at the rate of 160 lb. per acre—maintained its odour nearly a week, but lost it about nine days after application. The naphthalene was administered at the rate of about 120 lb. to the acre, and kept its repellent odour longer than the lime chloride.

Unfortunately, owing to the scarcity of cane beetles on this estate during the course of these experiments, results were inconclusive, as no grub-infestation occurred on either the treated or check plots.

Although attention was drawn by the writer to the possibilities of paradichlorobenzene as a deterrent against egg laying, in the year 1915 ("Queensland Agricultural Journal," vol. III., p. 263), field tests with this chemical were not commenced

until the year 1923, when experiment plots were established at Woree and elsewhere. With a view to following up a question of such economic interest, additional field experiments with paradichlorobenzene were carried out last November at Meringa and Banna.

Paradichlorobenzene as a Deterrent against Oviposition.

The crystalline nodules of this fumigant—after being passed through a quarter-inch-mesh sieve—were applied to plots of one-tenth of an acre by means of a machine operating on the same principle as a corn planter, but which had been adapted by us for such work. These plots were treated about a week after the first appearance of cane beetles (*Lepidoderma albobirtum* Waterh.), by burying doses of one-eighth of an ounce (apoth.) about 3 inches deep on each side of the cane rows, at intervals of about 15 inches apart, and 7 inches from the nearest cane shoots. A special roller attached at the rear of the machine served to consolidate and level the disturbed soil above the line of fumigation.

Used as a deterrent, paradichlorobenzene is best applied to the soil between cane rows just after emergence of the beetles, in order that the ground may have ample time to become impregnated with the objectionable odour before invasion of a plantation by egg-laden female beetles.

Plots laid down this season (1929) were fumigated, as described above, at the rate of 120 lb. of paradichlorobenzene per acre. In addition to acting as a deterrent against oviposition of the beetles, the amount used would remain operative in the ground for a month or longer, so that in the event of eggs being deposited later on by beetles making a late emergence, these eggs, or any first-stage hatching from same would be destroyed. Early applications of this kind are often desirable on certain classes of soil, since they can be made well in advance of the wet season, at a time when the soil is thoroughly open to such fumigation.

Growers should Read the following Notes on Fumigation.

When fighting any kind of insect pest, the economic entomologist aims not only at discovery of the cheapest and safest remedy, but also seeks to administer the same in the simplest and least expensive manner possible.

In the case of paradichlorobenzene which is cleanly to handle, dry, and non-poisonous to human beings and domestic animals, the ideal method in which to apply this fumigant will, in the near future, be found to be by means of some suitable fertilising machine, of a type that will bury manure about $4\frac{1}{2}$ inches deep, cover in the drill, and slightly consolidate the disturbed soil above the manure by passing broad-tyred wheels over same.

When giving the final dressing of manure, at a time when the cane is 4 to 5 feet high, the dry crystalline nodules of paradichlorobenzene—after being passed through a $\frac{1}{4}$ -inch-mesh sieve—are thoroughly mixed with the fertiliser.

In this manner the two can be applied to the soil in the one operation, which is a part of the usual routine field work. Moreover, at such stage of growth of the cane the grubs will still be small, so can be destroyed before having had time to work appreciable or serious injury to the roots.

The fumigant should be mixed with the manure in a proportion that will ensure the administration of about 120 lb. of the former per acre.

A VALUABLE AID TO THE FARMER.

A Nambour farmer, renewing his subscription to the Journal for two years, writes (20th January, 1929):—"I eagerly await the monthly issues of the Journal, as each issue has something new and interesting to the man on the land, and, in my opinion, every farmer who wants practical hints and useful information as regards farming could not do better than subscribe to the Journal."

THE POTATO TUBER MOTH.

By ROBERT VEITCH, B.Sc., Chief Entomologist.

THE potato tuber moth (*Phthorimæa operculella* Zell.) occurs throughout the various States of the Commonwealth, and is generally considered the most destructive insect enemy of the potato in this country. It was recorded as early as 1854 in Tasmania, and Tryon discussed its ravages in Queensland in 1889. There is much controversy with respect to the native home of this pest, some writers believing it to be of North American origin, while others consider its home is North Africa. It is an insignificant moth belonging to the family Gelechiidæ.

Nature of Injury.

The injury inflicted by this pest is of a twofold nature, for it may attack the aboveground portion of the plant or it may attack the tubers. Injury to the former is due to the larvæ of the moth mining in the leaves and leaf stalks and tunnelling in the stems. This damage to the foliage and stems may be quite appreciable, but is not generally considered nearly so serious as the injury to the tubers. In the tubers this pest, in its larval stages, may burrow and tunnel to such an extent as to very greatly depreciate their market value.

Plants Attacked.

Among the plants recorded as being attacked by this pest are the following:—Potato, tobacco, egg plant, Cape gooseberry, and tomato. It is, however, of importance as a pest only on the first two mentioned plants. On the potato it is, as already indicated, referred to as the potato tuber moth; whereas, when attacking tobacco, it is more commonly called the tobacco leaf miner or the tobacco split worm. In addition to attacking the abovementioned plants of economic importance, it also feeds on a number of weeds belonging to the Solanaceæ or potato family, included among these being the common nightshade (*Solanum nigrum*).

Life Cycle Stages and Life History.

The oval-shaped pearly-white eggs are extremely minute, and can just be seen by the naked eye. They may be laid on the leaves or stalks or on the tubers, and may also be found on the sacks in which infested potatoes are stored. When laid on the tubers they generally occur in clusters, and are usually laid in the eyes or at a scar on the surface of the tubers. On the foliage they do not occur in clusters, but may be found occurring singly, generally on the underside of the leaf. In the open, egg-laying does not usually take place during the day, but it is believed that in dark stores it takes place quite readily at all hours. Life history studies in North America have shown that the moth lays from 150 to 250 eggs over an egg-laying period of from one to two and a-half weeks.

At the end of the usual incubation period the larvæ hatch from the eggs, and if these have been laid on the leaves the larvæ commence mining in the foliage between the upper and lower surfaces of the leaves. If the eggs have been laid on the tubers the larvæ eat through the skin and either tunnel under the skin or burrow towards the heart of the tuber, eventually forming tunnels which may be two or three inches long. Infestation is most serious when it takes the form of

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THE VINUM SPRAYER, £4 15s.
Ideal for the application of wet spray.

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The Julian Duster is particularly suitable for Cabbage and Cauliflowers, because the dust emerges in puffs and eliminates waste between the plants.

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burrowing towards the heart of the tuber. When full fed the larva is slightly less than half an inch in length, and is white in colour with a faint pink tinge.

The full-grown larvæ generally leave the tubers to pupate, although they may do so just within the entrance to their tunnels. The pupa is formed within a silken cocoon, and may be found on the outsides of the tubers or between folds of sacking, or indeed in any of at least half a dozen other situations. Pupæ formed by the larvæ that have been mining in the leaves and tunnelling in the stalks may commonly be found among the dead, withered leaves or under lumps of soil. The pupa is slightly more than one-third of an inch in length, and is dark brown in colour.

The usual transformation processes take place within the pupa, and eventually the insignificant greyish-brown moth emerges. It has a wing spread of about half an inch, and a body length of about a-quarter of an inch. The moths mate, egg-laying takes place, and so the infestation continues.

Control Measures.

Control measures should aim very largely at safeguarding the tubers—firstly when they are in the soil, secondly while they are being harvested, and thirdly when they are subsequently in storage. Tubers in the soil may be attacked by this pest, and hence it is desirable to adopt cultural practices that will minimise the danger at this stage. For this reason it is a wise precaution to plant as deeply as is practicable, and to keep the thoroughly pulverised soil well hilled up so that the tubers will not be exposed. Once the tubers are exposed infestation will become serious. As the common night-shade weed is a host plant of this pest it should as far as possible be destroyed.

At harvesting certain precautions should be adopted, among the more important of which are the following:—The potatoes should be bagged and removed as soon as possible after digging, and furthermore the bags should be sewn up as soon as they are filled. The tubers should never be left overnight in the field exposed to the attacks of the moths, because if that is done many thousands of eggs may be laid on them and subsequently severe losses will be experienced in storage when the larvæ hatch out of the eggs. Furthermore, the harvested potatoes should on no account be covered with the tops, because if these are infested the larvæ will desert the fast withering leaves and stems and burrow into the tubers. The potato tops, according to Australian authorities, should be burned as soon as practicable after the harvesting of the tubers. An American investigator, however, recommends that such a practice be abandoned because of the destruction of the parasites that may be associated with the tuber moth. The question of parasite control raised by this recommendation seems worthy of some further investigation in Queensland to determine to what extent useful parasite control exists in this State. The harvested tubers should, if possible, be kept in a storeroom to which access by the tuber moth is not readily obtainable. The not infrequent practice of leaving tubers heaped up in an exposed condition in an unclosed storeroom merely invites serious trouble.

Fumigation of tubers that have become infested with potato tuber moth larvæ has been recommended in the United States, carbon bisulphide being used at the rate of 2 lb. to 1,000 cubic feet, the duration of fumigation being forty-eight hours. It is said that, under American conditions, the treated tubers are not injured, and that the whole of the larvæ and moths and the great majority of the eggs and pupæ are killed. The fumigation may have to be repeated if infestation continues.

THE BUFFALO FLY.

MINISTERIAL STATEMENT.

The Minister for Agriculture and Stock, Mr. W. Forgan Smith, said recently in the course of a Press statement, that the presence of Buffalo Fly in Queensland was a matter of grave concern to the pastoral industry of this State and of the Commonwealth generally.

The fly was first detected in the Northern Territory many years ago. From the Territory it has already spread westward, and for some years past it has been a menace to the cattle industry in the northern portion of Western Australia.

In January, 1927, the attention of the Commonwealth Government was called to the possibility of the fly spreading from the Northern Territory into Queensland if an effort were not made to restrict it to the Territory, but in this connection, nothing in any way effective was done by the Commonwealth Government in preventing the spread of the fly eastward and southward of the coastline and across the border into the Gulf country of Queensland.

There is no doubt that the fly has come to Queensland from the Territory. The State Government, some time ago, approached the Commonwealth Government and suggested that the matter of bringing this pest under control should be treated from a national standpoint and that the action necessary to restrict the spread of the fly should be taken by Commonwealth authorities. Unfortunately, the latter have not definitely advised the State Government as to whether or not they are prepared to treat the matter as of national concern. This delay is much regretted, for it obviously increases the risk of infestation of Queensland herds. The State Government intimated to the Commonwealth Government its preparedness to co-ordinate with it in any reasonable way in regard to any investigations that may be considered necessary.

Biological Control.

It is now understood that definite arrangements have been made to carry out the necessary preparatory investigations with the view of bringing the pest under biological control. There is a possibility that this may be found a satisfactory means of checking the spread of the fly and reducing the seriousness of its menace to stock; but in the event of a suitable predatory insect being discovered, it will probably be some years before its influence may be manifested. It is, therefore, necessary that some method of restricting the extension of the fly should be made operative in the interim.

Action has been taken in this State to declare the condition arising from infestation by the Buffalo Fly a notifiable disease under the Diseases in Stock Act, and the stock crossing place near Wollgorang, has been closed, and in practice, this means that no stock may enter Queensland from the Territory north of Camooweal. The question as to whether or not the closure of additional stock crossing places shall be necessary to further protect the cattle industry of Queensland is now under consideration.

Additionally, all possible precaution is being taken by the State Government to keep the fly in check pending receipt of definite advice of the attitude of the Federal Government on the matter.

QUEENSLAND RAIN FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The White Bean is a straight-stemmed tree which attains a height of about 100 feet and a stem diameter of about 2 feet. It is known to botanists as *Ailanthus malabarica*. Another botanical name, bestowed upon it by Ferdinand Mueller, is *Ailanthus imberbiflora*, but it is evidently the same species as the Indian one which is known as *Ailanthus malabarica*. The bark is grey or brown, often very finely scaly, and exudes an almost colourless resin. The wood is light in weight, pale in colour, and is not highly figured. It could be used for indoor work where lightness is required and there is no demand for ornamental markings. Dr Lauterer stated that the resin makes a good ointment for chronic ulcers. He also suggested that it might be used for softening hard and quickly-drying varnishes. The trees are found in the "brush" forests of Northern New South Wales (C. Moore) and in Queensland, as far north as Bowen. It is also found in India, Ceylon, and Cochin China.



Photo.: W. D. Francis.]

PLATE 65.—THE WHITE BEAN (*Ailanthus malabarica*).

A tree in the Imbil Rain Forest. A large Bird's Nest Fern (*Asplenium nidus*) is shown on the tree in the upper part of picture.



Photo.: Department of Agriculture and Stock.]

PLATE 66.—WHITE BEAN (*Ailanthus malabarica*).

A, portion of leaf; B, flowering bearing twig; C, fruit-bearing twig.

THE POULTRY INDUSTRY OF QUEENSLAND.

SOME ECONOMIC PHASES.

The economic condition of the poultry industry is at present the subject of close consideration by all interested in it. This article does not cover the whole range of poultry keeping (ducks, geese, pigeons, &c.); it rather analyses some phases of the business of egg production, and seeks to emphasise the necessity of the adoption of up-to-date methods by individual poultry keepers. There has been a tendency in some directions to take up poultry keeping with a lack of appreciation of what is involved. It has to be observed that haphazard and ill-directed poultry keeping cannot possibly be remunerative to those concerned, although the resultant egg production may menace the livelihood of those in the industry who are working along approved lines.

Consideration of the details of farm economics by the individual is therefore just as important as collective action by the producers generally in matters of major industry economics. It is principally the former phases that are herein examined. It would be preferable for anyone contemplating taking up poultry keeping to pause before doing so, unless he is prepared to employ only systematic methods, and to do so consistently and in every department of the business. Much disappointment would thereby be obviated.

Within recent years the purchase of day-old chicks as a rapid way of commencing business has become extensive. Consideration, however, should be given to the points emphasised in this article as to the use of stock of high producing strains. There has been a tendency to use eggs regardless of their source of origin, and it is important that purchasers of day-old chicks should appreciate this factor.

DOMESTICATION.

Poultry have not always been domesticated. The present farm flocks had for their progenitors the wild fowl of the jungle. These wild fowl were certainly not as prolific as the fowl we have to-day, and without the controlling hand of man the latter would revert to the habits of their predecessors. Continuous egg production is a feature which has been evolved in the breeding of domesticated fowls, and even when this is only possible when the birds are correctly fed.

IMPROVE EGG SIZE

by hatching only from eggs over 2 oz. in weight and by purchasing only day-old chickens from breeders who follow this practice.

Where reversion to natural type and conditions takes place, egg production becomes limited to the extent necessary for regeneration in the most favourable months of the year—the breeding season—when the birds are in good physical condition, and when the natural supply of food is most abundant. A plentiful supply of food, and the genial climatic conditions of the spring months, the natural breeding season, induce, in the first place, egg production and give reasonable assurance

of a supply of food for the young. The business of the poultryman is to adapt these characteristics to be of maximum use to man. He must maintain his stock in perfect physical condition for as long as possible throughout each year. To do this, every effort must be made to make the surroundings of the poultry approach, as nearly as possible, the genial conditions of spring, while, in feeding, animal food of some kind must be supplied, for insect life is largely the natural food supply of birds.

What are the poultry products which may with advantage be developed?

There is the flesh, which, properly served, is a valuable and most palatable food, but we in Queensland have a very large number of cattle, sheep, and pigs, and poultry flesh is subject to keen competition from these sources. Not losing sight of the possibilities of poultry meat, it would be as well to stress the value of the egg—the field peculiar to poultry—for which a more popular demand could be developed by the retention of its natural quality, as it is most nutritious, containing all the essential elements for the building up of bone, flesh, &c., necessary for our physical maintenance and development.

What of the Poultry Industry in Queensland?

On account of the genial climatic conditions and the general abundance of succulent herbage during the greater portion of the year, poultry raising is extensively engaged in throughout the whole of the State. Numerous farmers make poultry raising their sole source of income. Others engage in this industry as an adjunct to general farming, while the practice of the suburban householder to keep a flock is general.

BREED FROM VIGOROUS STOCK.

Healthy, vigorous breeders produce strong chickens.

On poultry farms where producers specialise in the industry, the production per bird is greater than when it is carried on as an adjunct to other work; also the product reaches the consumer in a much fresher state and therefore commands higher values.

The mixed farmer may obtain, by systematic breeding and feeding, production equal to that of the specialist. By forwarding his eggs to market twice weekly during hot weather and once weekly during the winter, he obtains values very little, if any, below those received by the producer within easy reach of the market. By regularly placing on the market an article of reliable quality, he will assist in increasing the per capita consumption, and thus reduce gluts.

What, then, are the factors of success in poultry raising?

In the rearing of his stock the poultryman must pay heed to the natural processes, and to avoid losses he must provide against unfavourable conditions.

In the commercialising of the main poultry product (eggs) he must maintain the health and vigour of the bird that is natural to the mating and breeding season, by judicious housing and proper feeding.

In the study of marketing, he must cater for the consumer by producing eggs of standard size, and delivering them to the markets in a fresh and clean condition.

Generally, then, the essentials of successful poultry keeping may be summarised as follows:—

- (1) Proper housing to afford protection from unfavourable weather conditions, and to ensure virile stock.
- (2) Economy and efficiency in rearing young stock.
- (3) Birds of suitable type with heavy producing capacity and laying standard-sized eggs.
- (4) Close attention to market requirements to ensure remunerative prices. (See page 221.)
- (5) Feeding to induce maximum production.

Housing.

A survey of many farms indicates that one of the principal causes of impaired health and high mortality is due to inadequate housing. It is not the case only that the housing accommodation is too small, but that it is of the wrong design and does not lend itself to the easy maintenance of those sanitary conditions necessary to health and vigour. Elaborate and costly houses are not necessary, but they should be of sufficient size for easy access, and the floors should be as impervious as possible, such as concrete, so as to permit of thorough cleaning at definite periods. Buildings are generally erected for a definite number of birds, but it is found that, as the flock increases, the tendency is to use these buildings for greater numbers than those for which they were originally designed. This evil is not only noticed with reference to the accommodation of adult stock—where the least harm is caused—but it is more pronounced in the accommodation used for the rearing of young chickens and growing stock.

HATCH CHICKENS EARLY.

Early hatched chickens (July, August, and September) produce the greatest number of eggs when values are high.

The success of a poultry raiser is dependent firstly upon the number of chickens that are reared to maturity, and, as overcrowding is one of the principal causes of mortality amongst chickens, the consequences of insufficient accommodation become most serious as a poultryman extends his business. It has also to be borne in mind that the loss through overcrowding does not end in the death of chickens. Others may survive improper treatment, but their health and vigour are so impaired that their potential egg yield is greatly decreased.

SYSTEMS OF ACCOMMODATION.

There are three practices commonly adopted, viz.:—

- (1) Intensive, where the birds are kept entirely under cover;
- (2) Free range, where a house is erected to provide sleeping accommodation and unrestricted liberty permitted; and
- (3) House and yard, where a house is provided for sleeping quarters and liberty is restricted by the erection of a run.

Under the intensive system the birds are kept entirely under cover, and are thereby afforded the maximum protection from climatic conditions, ensuring greater stability in production. The health and condition of the birds are readily observed by the farmer. Further, it is possible to thoroughly free the house from excreta at regular intervals.

Under the free range conditions, soil contamination from the excreta of the stock naturally takes place, but owing to the unrestricted range and the feeding on the soil by plant life, soil contamination does not become serious. The birds are, however, exposed to climatic variations, and the egg yield is not as stable as under the intensive system. There is, however, the compensation in the reduced cost of feeding, as birds obtain a good deal of their natural food supply by foraging.

The yard and house system has the disadvantages and none of the advantages of both the intensive and free range systems. The addition of the yard adds to the cost of accommodation. The birds are exposed to climatic conditions as much as they are under the free range system. Egg production is not stable, nor are the birds in a position to gather any of their own food requirements. The most serious disadvantage, however, of this system is soil contamination. A good many of the highly contagious diseases of poultry, and internal parasites, are transmitted from bird to bird through the excreta. Many organisms of the common diseases of the fowl will lie dormant in the soil ready to cause infection on the first favourable opportunity. Although the excreta may be scraped regularly from the surface of the poultry yard, many of the minute organisms and worm eggs are below the surface, and it is only necessary for favourable conditions to arise before infection takes place.

When the house and yard system is adopted, two yards should be erected for each house. This enables one yard to be spelled, planted with some crop suitable for green feed, and the soil thus sweetened.

For the specialist poultry keeper, where large numbers of laying stock are to be kept, the intensive system of housing is most suitable. For the farmer who raises poultry as an adjunct to other rural pursuits, the free range system offers many advantages.

CARE OF GROWING STOCK.

In the housing of growing stock the pens are only occupied throughout six months of the year, and as egg production does not enter into consideration, the exposure to climatic conditions is not so material. Likewise, soil contamination is not pronounced. To obtain the maximum development, exercise must be provided. The free range system answers admirably for the purpose of the development of growing stock, but as several hundred pullets of different ages have to be reared, it is necessary to erect netting fences for the separation of the various lots. These runs should be made as large as the land will permit, allowing not less than 6 square yards per bird, and the number in any one pen should not exceed one hundred.

BROODING OF CHICKENS.

There are numerous systems of brooding chickens. The system to be adopted depends largely upon the number to be handled, the personal inclinations of the farmer, and the capital to be expended. The subject of brooding is too extensive for full reference in this bulletin, and farmers are advised that additional information may be obtained from the Department of Agriculture on this subject.



PLATE 67.

A good Poultry House constructed from plans supplied by the Department of Agriculture and Stock. Housing under the intensive system allows $3\frac{1}{2}$ to 4 sq. ft. of floor space for each bird; under the free range system, 2 sq. ft. are sufficient.

The Cost of Rearing.

It must be pointed out that, however ideal the brooding and rearing conditions are made, without suitable foods being used throughout the growing stage, unthrifty stock will be the result. To arrive at the cost of the chicken, the value of the breeding stock, breeding pens, feed consumed by breeding stock, incubators, fuel, results obtained from incubation, and labour have all to be taken into consideration. These items vary considerably on different farms, but exclusive of labour and the value of stud stock, the cost of a chicken should not exceed 5d.

This cost is arrived at on the following basis:—

| | Rate per Chick. |
|---|--------------------|
| 10 per cent. interest and depreciation on a 1,000 chick-plant valued at £60 | d. 1.44 |
| Two eggs per chick at 1s. 6d. per dozen (cost based on poultryman using eggs produced by himself) | 3.00 |
| Cost of fuel | .55 |
| Total | 4.99 |

Note.—Proportionate cost of males is not taken into consideration. One male may sire 240 chickens and last two years. The proportionate charge would be $\frac{1}{3}$ d. per chick for every £1 value of the bird.

A larger plant and better hatching would reduce this cost; both are feasible.

Assuming that a chicken one day old costs 5d., the cost of rearing to maturity, allowing for mortality and the cost of rearing the male birds, can be determined. Many producers state that the food alone, to produce a pullet, costs 5s. This figure is probably on the high side, and various tables have been prepared from experiments conducted, showing the consumption of food and its cost at prices within the reach of every poultry-raiser:—

TOTAL FOOD CONSUMED IN FORTNIGHTLY PERIODS ACCORDING TO AGE.

| Age. | White Leghorns. | Rhode Island Reds. |
|------------------|-----------------|--------------------|
| | Lb. | Lb. |
| 2 weeks | .22 | .24 |
| 4 weeks | .79 | .81 |
| 6 weeks | 1.71 | 1.85 |
| 8 weeks | 3.11 | 3.42 |
| 10 weeks | 4.88 | 5.37 |
| 12 weeks | 6.86 | 7.63 |
| 14 weeks | 8.97 | 9.94 |
| 16 weeks | 11.24 | 12.56 |
| 18 weeks | 13.84 | 15.70 |
| 20 weeks | 16.64 | 18.91 |
| 22 weeks | 19.31 | 22.34 |
| 24 weeks | 22.13 | 25.77 |

Many feeding tests have been conducted, the results of which support the foregoing table, and it is therefore possible to estimate fairly accurately the consumption of food necessary to rear chickens to maturity. A working basis would be from 20 to 25 lb. for Leghorns and light birds generally, and 25 to 30 lb. for the heavy breeds most common to Queensland.

In every batch of chickens there are generally 50 per cent. of cockerels. These birds are sold by many breeders as soon as the sex can be distinguished, while others retain them until greater development has been made. It is questionable if many breeders give consideration to the actual costs of cockerels when they are disposed of, and with the object of guiding breeders, the following table is prepared. The mortality that occurs among chickens is based at 12 per cent. and spread over the first six weeks, as it is considered that losses which occur after this stage are largely due to faulty management. The chickens at the outset are valued at 5d. each, being cost on leaving the incubators.

The total feed consumed per chick is taken from the previous table, and is valued at 14s. per 100 lb. No allowance has been made for labour or interest on plant:—

COST PER CHICK ALLOWING FOR ORIGINAL COST WHEN HATCHED (5D.), FOOD CONSUMPTION AT 14S. PER 100 LB., AND 12 PER CENT. LOSS DURING FIRST SIX WEEKS.

| Age. | | | | | Light Breeds. | Heavy Breeds. |
|----------|----|----|----|----|---------------|---------------|
| | | | | | s. d. | s. d. |
| 2 weeks | .. | .. | .. | .. | 0 5-59 | 0 5-62 |
| 4 weeks | .. | .. | .. | .. | 0 6-77 | 0 6-80 |
| 6 weeks | .. | .. | .. | .. | 0 8-68 | 0 8-91 |
| 8 weeks | .. | .. | .. | .. | 0 11-03 | 0 11-54 |
| 10 weeks | .. | .. | .. | .. | 1 2-00 | 1 2-81 |
| 12 weeks | .. | .. | .. | .. | 1 5-33 | 1 6-60 |
| 14 weeks | .. | .. | .. | .. | 1 8-86 | 1 10-48 |
| 16 weeks | .. | .. | .. | .. | 2 0-67 | 2 2-88 |
| 18 weeks | .. | .. | .. | .. | 2 5-03 | 2 8-15 |
| 20 weeks | .. | .. | .. | .. | 2 9-73 | 3 1-54 |
| 22 weeks | .. | .. | .. | .. | 3 2-21 | 3 7-30 |
| 24 weeks | .. | .. | .. | .. | 3 6-94 | 4 1-06 |

The marketing of surplus cockerels at the stage most advantageous to the grower has a direct bearing on the cost of pullets. Breeders who market these immediately the sex is determinable (that is, after four weeks old) may obtain from 3d. to 6d. each for the cockerels. From the table it will be seen that the cost to this age has not been recovered. At the same time, the loss is not excessive, nor is it necessary to have an extensive plant which is used only for a few months in the year for rearing cockerels. There is great fluctuation in market values for light

INCREASE EGG PRODUCTION

by

breeding from single-tested stock and their progeny.

breeds such as Leghorns. The table of costs has been compiled for poultrymen who specialise in the industry, to enable them to study market values and dispose of the surplus cockerels to the best advantage. Breeders of birds of heavy varieties will find it profitable to retain the cockerels until they have made good development—say, to the age of twenty weeks—but it is necessary to point out the rapidity with which costs increase. Lower values are also received for birds which have made full sexual development and have become staggy.

The cost of a matured pullet depends upon the policy pursued by the individual. There must be brought into consideration the value received from the sale of cockerels, for with some varieties of stock, cockerels are always reared at a loss, while with breeds of heavy varieties cockerels return a fair profit, exclusive of labour, over costs. The progressive poultry-keeper with the assistance of the table given on page 217 can readily ascertain the costs for himself according to the plan he is following.

Egg Production.

Poultry-raisers have, independently of breed, two classes of stock from a production point of view—namely, birds during their first year of laying (pullets) and older birds (first and second year hens). The average production that is obtained from either class differs considerably. There is also great variation on different farms between the average production obtained from each section. There are farmers who obtain an average of 200 eggs per bird from some pens of the pullet section of their flocks, while others only obtain 140 to 150 per bird. The production obtained per bird is the final determining factor to success in poultry raising, and farmers should take as their objective an annual average of 200 eggs for pullets.

As an illustration of the variation in production between pullets and hens, the following figures of tests carried out in three successive years may be quoted:—

| | | | | | |
|----------------------------------|-------|----|-------|----|-------|
| Pullet, average annual egg yield | 195.7 | .. | 219 | .. | 208 |
| (White Leghorn) | | | | | |
| Hen, average annual egg yield | 160.8 | .. | 165.4 | .. | 147.9 |
| (White Leghorn) | | | | | |

In these tests only the best first-year producers were retained, otherwise the average production of the hen section would not have been so high. *Therefore only the best of a flock for second or third year production should be retained.*

INCREASE FLOCK AVERAGE

by culling—

1. Old hens as they cease to lay;
2. Excessively fat hens;
3. Birds that show no signs of wear.

From the above it will be seen that there is an average of approximately four dozen eggs per annum in favour of the pullets over the hens. With eggs at an average price of 1s. 6d. per dozen, and the cost of rearing a pullet at 3s. 6d. to 4s., some breeders may come to the conclusion that when the value of the carcass of the hen is taken into consideration, it would be more profitable to keep only pullets for the purpose of egg production. This is not so, for, to put this theory into practice, a most extensive incubator and rearing plant would be a first essential. Pullets, when about to come into production, are also very susceptible to climatic change and moult. The moult materially reduces the expected egg yield, therefore it is better for the producer to cull the older birds rigidly, and only make the necessary annual replacement to maintain the flock at a specified number.

Seasonal Fluctuation.

Another important factor is that the average profit per bird is largely influenced by the period of the year during which production takes place. The following table is prepared, showing the relative position of a flock averaging 155 eggs and one averaging 204. These figures are taken from tests which have been conducted during recent years, and are therefore a fair average of the position with respect to the proportionate values of the produce of the hen and pullet sections of flocks:—

| Month. | Average Market Value 1st grade eggs. | Flock Average, 155 Eggs. | | Flock Average, 204 Eggs. | |
|---------------|--------------------------------------|------------------------------------|----------------|------------------------------------|----------------|
| | | Production per Hen. | Value. | Production per Hen. | Value. |
| | <i>s. d.</i> | Eggs. | £ <i>s. d.</i> | Eggs. | £ <i>s. d.</i> |
| April | 2 8 | 5.2 | 0 1 1.86 | 8.9 | 0 1 11.73 |
| May | 2 8 | 3.8 | 0 0 10.13 | 16.2 | 0 3 7.2 |
| June | 2 4 | 6.3 | 0 1 2.7 | 16.7 | 0 3 2.96 |
| July | 1 6 | 12.4 | 0 1 6.6 | 18.4 | 0 2 3.6 |
| August | 1 4 | 18.3 | 0 2 0.4 | 21.5 | 0 2 4.66 |
| September .. | 1 3 | 19.6 | 0 2 0.5 | 21.0 | 0 2 2.25 |
| October | 1 2 | 20.0 | 0 1 11.33 | 21.5 | 0 2 1.08 |
| November .. | 1 4 | 17.9 | 0 1 11.26 | 19.8 | 0 2 2.4 |
| December .. | 1 8 | 17.3 | 0 2 4.82 | 17.0 | 0 2 4.3 |
| January | 1 8 | 12.8 | 0 1 9.33 | 16.4 | 0 2 3.3 |
| February .. | 2 3 | 12.3 | 0 2 3.67 | 13.6 | 0 2 6.6 |
| March | 2 3 | 9.5 | 0 1 9.37 | 13.1 | 0 2 5.47 |
| Totals | .. | 155.4 | £1 0 11.97 | 204.1 | £1 9 7.55 |
| | | Average price per dozen, 1s. 7.5d. | | Average price per dozen, 1s. 8.9d. | |

From the table it is observed that heavy-laying flocks are producing freely during the period of the year when prices are highest, while low production is taking place from poor flocks. In the spring period, when prices are invariably low, the poor layer is probably laying equally with the heavy layer, but the latter class of bird scores over the former during all other periods. The prolificacy of the bird, therefore, has a definite money value to the poultry-keeper over and above the value of the actual excess number of eggs produced.

PARTIAL MOULTS REDUCE EGG YIELD.

Do not move pullets after they commence laying, nor make drastic changes in their ration, and so assist in the prevention of partial moults.

Comparing two farms each having 400 birds, one with good laying stock and the other with birds of medium quality, the position could be set out as follows:—

GROSS INCOME.

400 good birds produce 6,800 doz. eggs at 1s. 8.9d. = £592 3s. 4d.
 400 medium birds produce 5,166½ doz. eggs at 1s. 7.5d. = £419 15s. 10d.

Taking a dozen eggs as a basis, the average price received from a flock of medium producers as compared with that of a flock of good producers, is not very pronounced, but when it is spread over a period of twelve months on a flock of 400 birds, it grows to the extent of £172 7s. 6d.

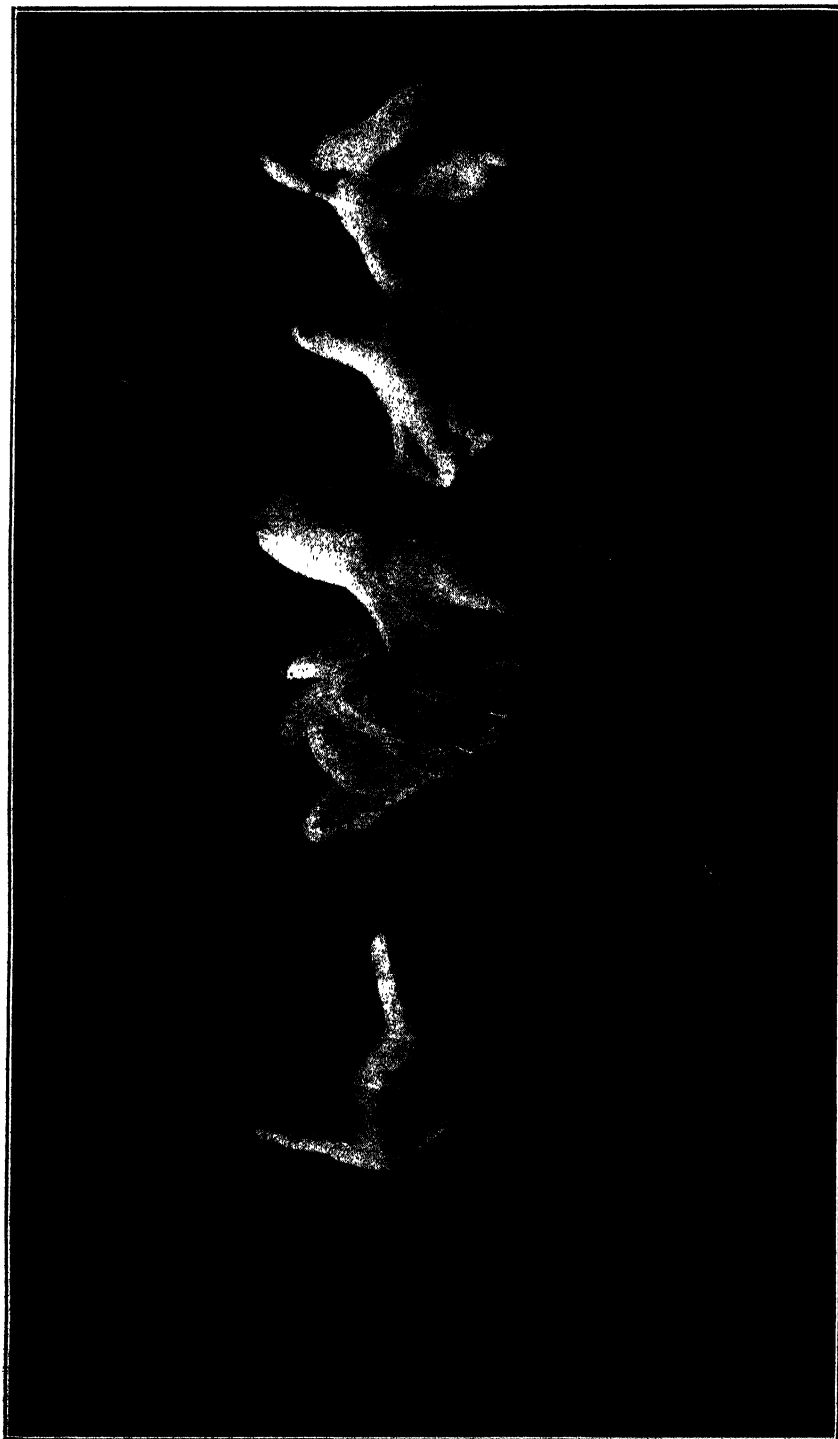


PLATE 68.—A PEN OF TYPICAL WHITE LEGHORNS.

Size of Egg.

This is a most important factor in commercial poultry-raising, and from an industrial and a monetary point of view, the size of the eggs means almost as much to the breeder as numbers. Collectively, if the size of egg is not maintained by producers, it will eventually mean that satisfactory markets cannot be secured for the surplus production. At present it is mainly by export that any surplus can be disposed of, and if this avenue is restricted by the production of undersized eggs, local values will sink to such a level as to make poultry-raising unprofitable. Small or second sized eggs realise throughout the year from 2d. to 5d. per dozen less than the standard 2-oz. eggs. An illustration has already been given, which emphasises the great financial loss sustained from a variation in price of less than 1½d. per dozen on a flock of 400 birds, and from this breeders can readily estimate what a loss of 2d. to 5d. per dozen will amount.

It occasionally happens that a hen laying small eggs produces large numbers. The unsound policy of using the progeny of this hen for breeding purposes has been largely practised. An erroneous impression exists that as the size of egg decreases numbers increase. This is not so. Egg-laying competitions have demonstrated time after time that it is not necessary to employ a layer of small eggs to obtain high production.

Every effort must be made by poultry-raisers to eliminate the hen producing undersized eggs. To do this, never use for breeding purposes hens laying small eggs, and use males which are the progeny of a large-egg hen. It is not sufficient to select the breeders on the question of size of egg when fully matured. A strain of bird should be built up which will commence early in life to produce a standard egg, and it is from that class of bird that poultrymen should select their future breeding stock.

FARM FACTORS INFLUENCING MARKETING.

The question of marketing has to be considered in relation to—(1) The egg; (2) table birds, including birds specially reared for table purposes, stock that have ceased to be profitable, and young males; and (3) poultry manure.

The latter product is not of great importance at present, as the demand for it is very limited, and in many instances it is found more profitable to use it as a fertiliser for the growing of green feed than to sell it. At the best sales possible, it little more than covers the purchase price of material used for scratching purposes.

Marketing, particularly in the first stage, is most certainly a function which definitely concerns the individual poultry-keeper. It is not merely the task of the Egg Board or the commission agents. The poultry-keeper considerably influences the ease of marketing by the retention of the quality of the egg. If every consideration is not given to the preservation of the quality of the egg as laid, the task of marketing is made most difficult. Producers should therefore remember that the earlier the egg reaches the consumer after being laid the better.

The principal factors influencing successful marketing are—

- (1) The production of unfertile eggs.
- (2) Clean and ample supply of nests. (Eggs when laid are moist, and dust and other matter readily adhere.)

- (3) Gathering at frequent intervals to prevent eggs becoming soiled.
- (4) Collecting in clean and dry receptacles.
- (5) Storage (pending marketing) on the farm in cool quarters free from draughts and foreign odours.
- (6) Regular and frequent despatch to market—twice weekly during warm weather; once weekly during winter.
- (7) Using dry, clean fillers, and cases free from moulds when packing for market.

Some eggs are lowered in quality to such a degree, owing to improper care, that they only realise two-thirds of the value of the choicest article. The seriousness of this will readily be recognised. It is a direct financial loss to the producer, while at the same time poor quality eggs seriously restrict consumption. It is not difficult for the farmer to maintain in wholesome condition the product of his birds; *common sense methods of handling and cleanliness are all that are required.*

Study the production cost of cockerels and market accordingly.

In the marketing of table poultry, producers must consider three primary features; the grading of stock as to age, as to size, and as to condition.

There is a correct time for marketing stock, whether they are young birds or old. Every day they are kept on the farm after reaching that period is adding to the farm cost. Old hens should be disposed of immediately they cease to lay. This not only reduces feeding costs, but assures the stock being marketed with as few pin feathers as possible, a matter of considerable importance to the poulterer.

Among the numerous hens that a farmer has to dispose of on account of low production, a few will be in poor condition. This class of bird should not be marketed, as its inclusion with other birds lowers the value of the whole consignment. An attempt to fatten such birds usually proves unprofitable, and therefore should not be undertaken. If cockerels are specially reared for market, they should be well grown and in good condition. For market purposes the most economical development and condition are obtained by liberal feeding. In crating the stock that are to be marketed, thought should be given to the comfort of the birds and to the facilities afforded to buyers for inspection. This will ensure that the birds will be as attractive when they reach the markets as when they left the farm, and that the buyer will have the opportunity of definitely ascertaining what he is buying.

MARKETING STATISTICS.

The Queensland Egg Board, the growers' organisation which was formed under the Primary Products Pools Act, has played an important part in the marketing of eggs during the last five years.

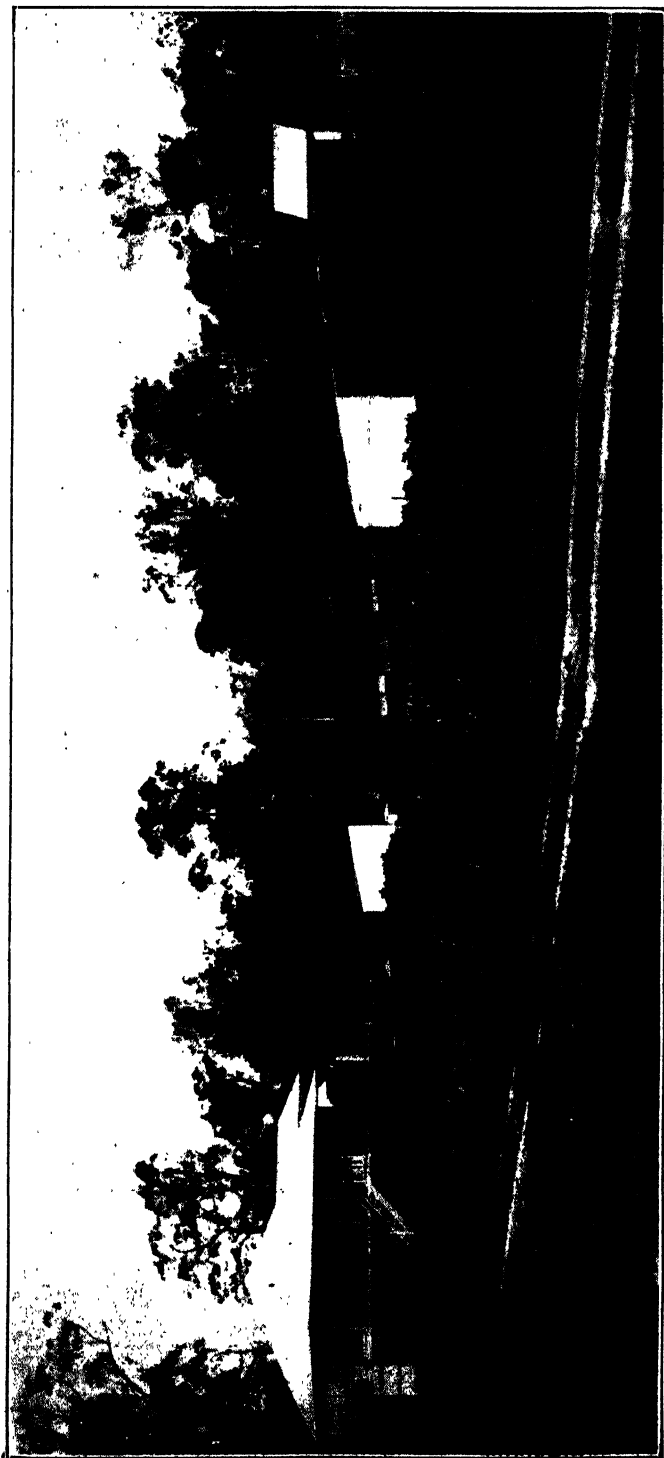


PLATE 69.—On a Queensland poultry farm. The intensive system adopted wholly for laying stock.

Since the Board began operations in 1923, a pronounced expansion of the industry has taken place, as the following figures will demonstrate:—

| — | | | | Quantities of Eggs handled. Dozens. | Exported. Dozens. | Cold Store. Dozens. |
|------|----|----|----|--|-------------------|---------------------|
| 1924 | .. | .. | .. | 932,000 | .. | 77,000 |
| 1925 | .. | .. | .. | 1,041,000 | 12,000 | 94,000 |
| 1926 | .. | .. | .. | 1,736,000 | 189,000 | 120,000 |
| 1927 | .. | .. | .. | 1,865,000 | 236,400 | 103,000 |
| 1928 | .. | .. | .. | 2,747,963 | 823,890 | .. |

The quantity of eggs supplied to the floors of the Board during the current year (1928) shows an increase of 48 per cent. over the 1927 figures, and 195 per cent. when compared with the quantities handled in 1924.

During the week of peak production (24th to 29th September, 1928) supplies were 70 per cent. greater than for the corresponding week of 1927.

These figures demonstrate the rapidity with which the poultry industry of this State has expanded under organised marketing.

FEED LIBERALLY.

The dry mash hopper can be used to ensure liberal feeding—an essential to high egg production.

Egg production has outstripped the local consumption at present, and producers must make every effort to encourage a greater demand by the careful attention to the quality of the egg, as quality plays the most important part in demand. It is economically unsound to continue to produce eggs in excess of the ability of the market to absorb.

FEEDING POULTRY.

Because some particular class of food happens to be produced on the farm and has a low market value, it does not necessarily mean that it is profitable to feed it to the fowls. In fact, no one class of food will give the best results. For instance, on many farms maize is produced for the purpose of feeding poultry. This grain is a good poultry food when fed in conjunction with some food rich in protein, such as milk or meat, but by itself will not produce eggs in any quantity, nor will young stock make the desired development when it is the sole source of food supply. The foregoing remarks apply to all foods, and it is therefore important for the subject of feeding to receive attention if poultry are expected to be profitable.

From feeding tests which have been conducted from time to time in various States of the Commonwealth, it is found that birds laying on an average 180 to 200 eggs per annum consume from 90 to 100 lb. of food each. Of the total food consumed by a hen, at least three-fifths goes towards the maintenance of the bodily functions. It has been found

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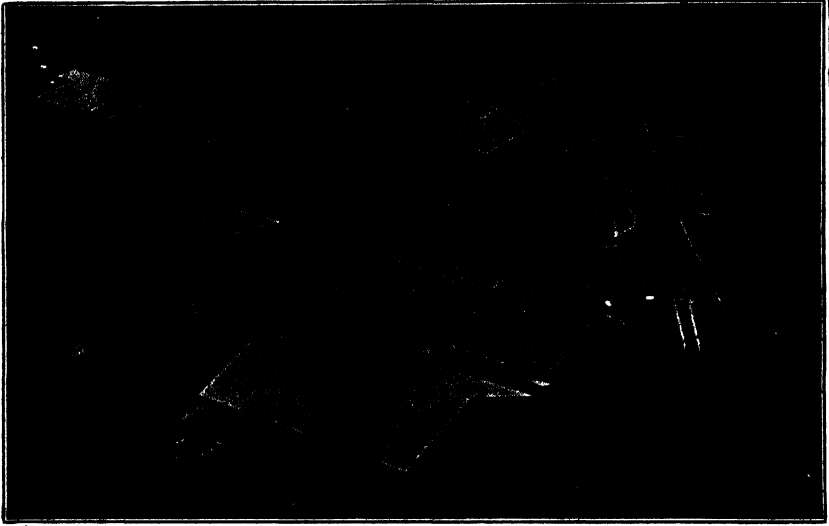
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by experiment that a hen may be maintained in perfect physical condition on a given quantity of food, and produce not one egg. This, then, emphasises the necessity for feeding in excess of bodily requirements.

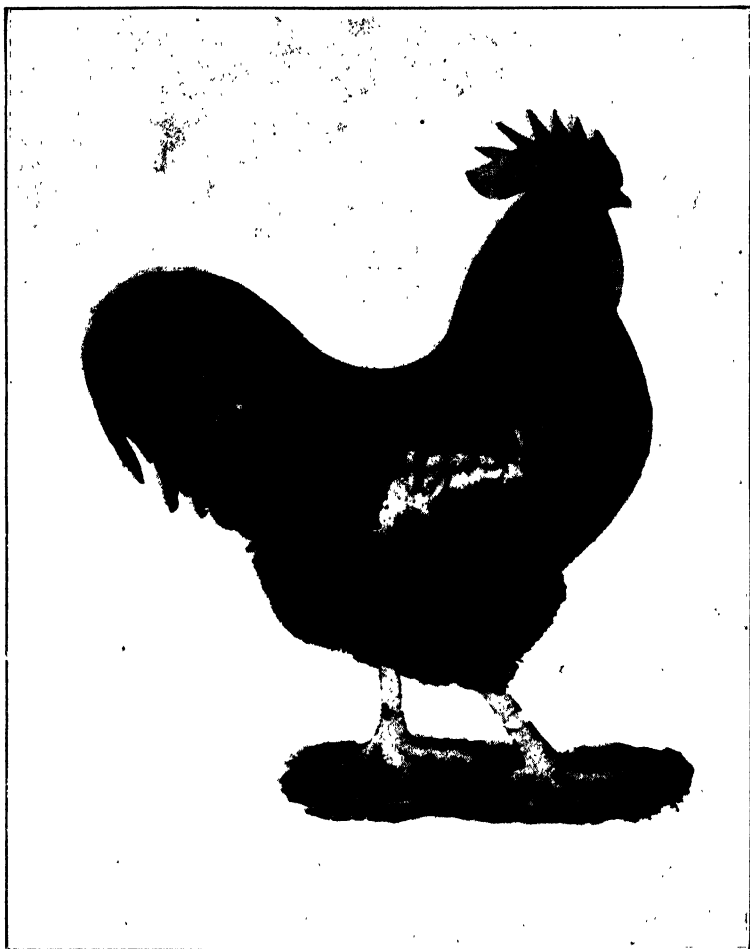


PLATE 70.—A GOOD TYPE UTILITY ORPINGTON COCK.

RETURNS OVER COST OF FOOD.

Experiments indicate that hens 3 to 5 lb. in weight laying approximately 200 eggs consume 90·3 lb. of dry matter per year, and that hens neither laying nor moulting may be maintained in perfect physical condition on a food consumption of 56·94 lb. All food contains moisture, but for the purpose of comparison it is sufficient to estimate the food consumption of a hen laying approximately 200 eggs per year at 100 lb., and to maintain a hen 60 lb. is consumed.

From these figures it will be observed that 40 lb. of food consumed in excess of bodily requirements produce 200 eggs, or for every 4 lb. of food twenty eggs are produced.

Assuming, however, that it takes 5 lb. of food to produce 20 eggs and 50 lb. for maintenance of the bird, the position may be set out as follows:—

TABLE SHOWING RETURNS OVER COST OF FEED OF HENS OF DIFFERENT PRODUCING ABILITY.

| | 120 Fgs Bird. | 140 Egg Bird. | 160 Egg Bird. | 180 Egg Bird. | 200 Egg Bird. |
|--|------------------|------------------|------------------|------------------|------------------|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Value of eggs produced at 1s. 6d. per dozen | 0 15 0 | 0 17 6 | 1 0 0 | 1 2 6 | 1 5 0 |
| Less cost of feed at 12s. per 100 lb. | 0 9 7 | 0 10 2 | 0 10 10 | 0 11 5 | 0 12 0 |
| Balance | 0 5 5 | 0 7 4 | 0 9 2 | 0 11 1 | 0 13 0 |

From the balance must be deducted—

| | £ s. d. |
|--|----------|
| (1) The cost of replacement (per bird) | 0 1 3 |
| (2) The proportionate charge of interest on plant | 0 1 4.2 |
| (3) The proportion of cost of labour (one man caring for 800 fowls at £221 per annum) | 0 5 6.3 |
| Total | £0 8 1.5 |

These figures conclusively prove that a flock of 800 birds averaging 140 first-grade eggs per annum will not return the commercial poultry farmer the basic wage.

What Return may be obtained from Poultry?

On some well-conducted poultry farms the average return per bird (all ages) is 10s., after all the food requirements are purchased at the ruling market rates. The poultryman who obtains this average has an efficient plant, gives careful attention to the breeding of his stock, and feeds them to obtain the maximum result.

Poultrymen desiring information are requested to communicate with the Department of Agriculture.

To arrive at the net income from any flock, the cost of plant and the cost of the food consumed have to be set against the returns. The minimum cost for the erection of plant, as recommended by the Department of Agriculture, would approximate £35 per 100 head of birds. The value of 100 head of laying stock would be not less than £30. The outlay, exclusive of residence and land, would be £65 per 100 birds.

Interest at 5 per cent. on the outlay and depreciation on the plant at 10 per cent. would total £6 15s. per 100 fowls. Provision has to be made yearly for the replacement of 50 per cent. of the flock, but as an offset against this cost, there is the value of sales from the old birds. This replacement of 50 per cent. of the flock costs approximately £6 5s.

per year. Assuming the average profit over cost of feed per year on a well-conducted farm is 10s. per bird, the position can be set out as follows:—

| | |
|--|------------|
| | £ |
| Revenue over cost of feed, per 100 birds | 50 |
| Less interest £6 15s., and cost of replacement £6 5s. .. | 13 |
| Net profit per 100 birds | <u>£37</u> |

From the above it will be seen that a flock of 800 suitable birds is required to secure a return of £296 per annum. However, the control of the costs is in the hands of the breeder. Constant selection, careful

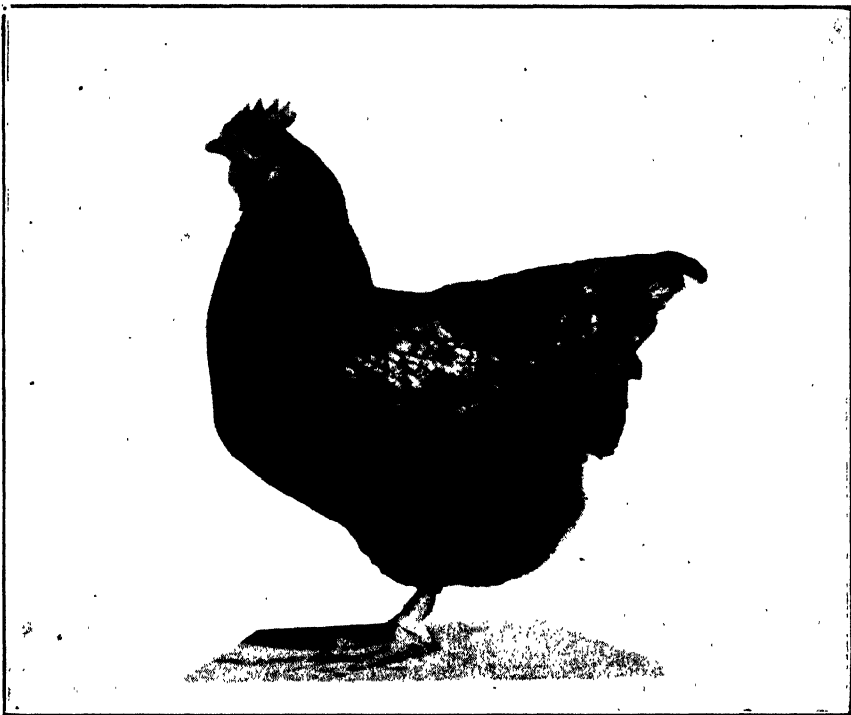


PLATE 71.—UTILITY ORPINGTON HEN—PRIZE-WINNER AT MANY SHOWS.

breeding, and attention to detail are at all times essential. The neglect of any one of these as before shown will have the effect of transposing the abovementioned return into an actual loss.

The dairy farmer, the fruitgrower, and the general agriculturist can obtain returns from his birds equal to that of the specialist by giving his methods of breeding and feeding close attention. It is uneconomic for the farmer to keep a greater number of fowls than he can reasonably care for. It is also uneconomic for the specialist poultry farmer to keep less than 800 laying fowls as otherwise he will not earn the basic wage. Such fowls also must return an annual average production of more than 140 eggs. If the poultry keeper finds it

impossible to hatch chickens at the most suitable period of the year (July to September), it would be much more profitable to purchase day-old chickens from reputable breeders than to rear stock hatched out of season, or which are the progeny of unsuitable breeding birds. Chickens hatched out of season are likely to be unprofitable to the individual and cause economic loss to the industry. Those hatched late in the year are slow in maturing and come into lay during the period of peak production. Those hatched early in the year mature rapidly and moult after a few months' production during the period of high supplies.

AIDS TO THE POULTRY-KEEPER.

The assistance rendered has taken the form of education, aid in efforts for orderly marketing, and in the procuring of well-bred stock. Instructors are attached to the Department of Agriculture and Stock, whose duty it is to address gatherings, visit farms, and advise farmers on all phases of the industry. Educational articles on various aspects of the industry appear regularly in the "Queensland Agricultural Journal," while bulletins on poultry subjects are issued free of charge on application. By the passing of the Primary Products Pools Act, poultrymen were enabled to establish co-operative marketing.

The provisions made for storage at the Government Cold Stores gives the poultrymen confidence so far as the further expansion of the poultry industry is concerned, as adequate storage is assured.

At the Queensland Agricultural High School and College, Gatton, many of the commercial breeds of poultry are maintained, and stud birds may be purchased at reasonable prices by established poultrymen or beginners in the industry.



PLATE 72.—BRED FROM VIGOROUS STOCK.

CAPONIZING.

By P. RUMBALL, Poultry Expert.

The question whether caponizing is profitable or otherwise is best left to the individual producer to decide, as the features governing the commercial side of the proposition, that is cost of feeding and ultimate sale, are of a varying nature.

The capon, however, has advantage over the uncaponized bird in weight, quality of flesh, cost of maintenance, &c. The opinion frequently expressed that capons grow to a greater size than cockerels is wrong. When the reproductive organs are removed cockerels lose any fighting instinct and lead a lazy, inactive life, thereby putting on more weight or flesh but not size. It is possible also to retain capons until they



PLATE 73 (Fig. 1).—BIRD IN POSITION FOR CAPONIZING. IT CAN BE TURNED OVER WITHOUT UNFASTENING, WHICH FACILITATES THE OPERATION.



PLATE 74 (Fig. 2).—CLEARING THE FEATHERS IN FRONT OF HIP JOINT AND HOLDING OTHERS BACK BY DAMPING.

are fully developed and to market them as desired. This is not so with cockerels, as they become troublesome and lose the quality of flesh. The inactive life a capon leads, naturally reduces food consumption, and so it is kept at greatly reduced



PLATE 75 (Fig. 3).—ASCERTAINING THE CORRECT POSITION FOR OPERATION BY LOCATING THE LAST RIB WITH THE FOREFINGER.



PLATE 76 (Fig. 4).—DRAWING SKIN BACK WITH FOREFINGER AND MAKING INCISION BETWEEN LAST TWO RIBS.

costs, which materially assist a producer in catering for a regular supply of poultry. To the mixed farmer, however, capons should appeal most, inasmuch as they can be allowed to range with the farm flock. There is no necessity of segregating sex, and by being sterile the egg product is in no way injured.

Appearance of a Capon.

The comb and wattles of a capon do not develop and the head remains small and colourless, having the appearance of unhealthiness. The pointed feathers of the neck and those in front of the tail and large sickle tail feathers grow profusely, and in countries where capons are recognised in their true value as table birds these feathers are left on the bird in dressing and serve as a trade mark.



PLATE 77 (Fig. 5).—INSERT SPREADER, ENLARGE OPENING AND TEAR MEMBRANE WHICH COVERS INTESTINES.

Marketing.

At present the caponizer should cater for regular customers, but if his supply is greater than demand the marketing of the surplus should take place when young birds of quality are scarce, which happens annually from March until early cockerels are on the market—say September. Cockerels of any breed may be caponized, but breeds of the light or small varieties, such as Leghorns, are not as suitable as the larger varieties, such as Orpingtons, &c., although in this article Leghorns have been used for illustration purposes.

The age at which the operation is to be performed naturally varies with development and various breeds, but generally speaking the correct period is between eight and twelve weeks when the chickens are about 2 lb. in weight. The next point which the caponizer must keep in mind is light. A good light (sunlight) is essential, especially to the inexperienced operator. With practice he can operate under indifferent conditions, but for a start the position of the various organs must be

thoroughly understood. The third requirement is to refrain from feeding and watering the bird for at least twenty-four hours—thirty-six would be better. Under such treatment the intestines become empty and will of their own account fall away from the side where the incision is made, and, as well as lessening the chance of injury, permit of the reproductive organs being seen much easier.

The Operation.

In addition to knife, spreader, probe, and forceps, a table and two pieces of soft cord with a running noose at one end and two half bricks attached to the other, with a basin containing a weak antiseptic solution, are necessary. The table may be an old packing case or barrel, or the operator may prefer to make a more elaborate and possibly convenient bench. The bird is fastened down by means of the cord and bricks, one noose being placed around its legs, and the other around its wings, close to the body, and the bricks allowed to hang down on either side. The correct position is illustrated in Fig. 1.



PLATE 78 (Fig. 6).—CLOSE-UP VIEW, SHOWING POSITION OF TESTICLE.

The next move is to pluck a few feathers off the seat of operation, which is just in front of the hip joint. In a bird of the correct age very few feathers will need removing, and those that are lying in the way can easily be held aside by damping them with the antiseptic solution which should always be used to cleanse the position to be operated on. The clear space obtained by doing this is illustrated in Fig. 2. Having done this the correct position to make the incision must be ascertained. This is best done by placing the thumb on the hip joint, gradually moving the forefinger along the body until the last rib is felt, as shown in Fig. 3. It is between the two last ribs that the incision has to be made, but before doing that draw the skin as far back as possible with the forefinger as shown (Fig. 4) so that when the operation is completed and the skin goes back to its natural position the wound in the skin and abdominal cavity are not directly opposite. Having made the cut insert spreaders, enlarge opening to about $1\frac{1}{2}$ inches, and gently spread the ribs as shown in Fig. 5.

When this is completed a thin membrane will be noticed covering the intestines. This has to be removed, which is done by means of the probe, as shown in Fig. 5, before the testicle can be seen. The testicle is easily noticed if the bird has been properly starved. It is yellowish-white in colour, runs parallel with the backbone, and in birds of correct age about three-quarters of an inch long and a little thicker

than a plump grain of wheat. The position of this is shown in Fig. 6, although somewhat enlarged due to the advanced age of the bird operated upon. With the forceps take hold of the testicle, being careful not to grasp the large artery which runs parallel with and close to it. Withdraw the instrument, as shown in Fig. 7, with testicle attached with a twisting motion, and after appendages have been twisted up and pulled out, cut them about $1\frac{1}{2}$ to 2 inches from testicle to make certain that no portion of the organ remains.

When the operation is completed on one side turn the bird and repeat the process. Some operate from the one side only, but this method carries more risk, and saving in time is doubtful.



PLATE 79 (Fig. 7).—SEVERING APPENDAGES AFTER REMOVAL OF TESTICLE.

In about a week it is a very difficult matter to find where the incision was made—a few wind puffs are occasionally met with, but they merely need to be pricked.

After the operation of caponizing turn the bird loose. If the operation has been correctly performed the skin covers the wound, and no dressing of any description is required. It is as well, however, to keep the capons in clean quarters and away from untreated birds for a few days, but beyond this other treatment is unnecessary.

POISONS IN RELATION TO STOCK.

Reference is made by the Chief Veterinary Surgeon of the New South Wales Department of Agriculture to the extreme carelessness frequently displayed by farmers in connection with poisons. It is well known that arsenic in almost any form and paint seem to have an attraction for cattle, and yet such material as sheep dip, cattle dip, prickly-pear poison, and other deadly poisons are often casually left in such positions that cattle may get at them. If a complete return could be obtained of all the stock in the State which die in a year as a result of this carelessness the figure would probably surprise many.

DIARRHOEA OR WHITE SCOUR IN YOUNG PIGS.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

The following maxims have been compiled as golden rules for the breeder who wishes to ward off attacks of diarrhoea in his pigs:—

1. Do not overfeed the sow immediately before or after farrowing or during the first ten days she is rearing her litter.
2. Do not feed sour, decomposed, or musty foods, and be careful also to keep musty, mouldy bedding out of the sow's sty.
3. Avoid changing the sow's food while she is suckling her litter unless it is found to be absolutely necessary; then effect the change gradually.
4. The moment any of the young pigs show the slightest sign of diarrhoea (scouring) reduce the sow's food supply by half, and compel her to take liberal exercise, the object being to reduce the quantity of milk she is producing. Some breeders believe that the sow should have one heaped teaspoonful of powdered sulphate of iron dissolved in hot water and placed in her feed; this will do no harm, and certainly would tend to reduce the supply of milk and tone up her system.

It is well to note that when the sow farrows she has an ample supply of milk (or she should have if she is in normal condition) for her progeny, and they soon reduce her normal supply; but some breeders in their enthusiasm and with a desire to give her a good time both before and after farrowing immediately increase her food supply and keep her trough well filled. Under this treatment the sow likewise becomes enthusiastic and produces heavier supplies of milk; consequently the young pigs get more than is good for them or is necessary, and as their digestive organs cannot effectively deal with the extra supply the result is that indigestion is set up, and this is generally accompanied by inflammation of the stomach and intestines. The pigs then sicken and a feverish condition follows; the bowels refuse to act properly, and grey-coloured, evil-smelling, profuse diarrhoea follows. The young pigs do not immediately lose their appetites, but their condition gradually grows worse, and they begin to die off. The owner frequently thinks they are dying of starvation, and continues to force the sow with food so that she will produce more milk. The sow thus becomes overburdened with milk, and as the suckers gradually drop away from her she cannot get rid of it; inflammation of her udders follows and she also sickens, and will probably suffer to such an extent as to lose her supply of milk altogether. This is commonly referred to as milk fever.

It is necessary to remember that the stomach of the young pig is very small and it requires small quantities of food only and at frequent intervals. They are, however, easily overdone and treating them is a difficult matter. To prevent trouble note that the sow should not be fed during the day she farrows; give her a thin gruel only, about eight or ten hours after farrowing, and very gradually increase her food supply after the suckers are born and until they are a week or ten days old. She must have sweet succulent green food and ample exercise, and when the pigs are ten days old they may be allowed to explore their surroundings, and gradually become accustomed to following the sow about. If, after all due care is taken to prevent the appearance of white scour in successive litters, it should occur and not yield readily to treatment, it would be better to seek veterinary aid, for the trouble may be due to infection.

To summarise: Immediately there is any sign of scouring in one or more of the young pigs, reduce the sow's food supply by half; compel her and the suckers to take exercise; give powdered iron in the food as advised; move the sow and suckers to a clean, dry pen, and feed the sow very lightly for a few days. If the ailment persists, give the sow a second dose of medicine (the powdered iron should be dissolved in hot water before being added to the food); give each of the suckers teaspoonful doses of castor oil on the first day, and again next day if still scouring; sprinkle the floors and yards lightly with air-slacked lime and keep them scrupulously clean; add a cupful of lime-water to the sow's food every day, and be careful not only to use sweet clean food, but also to place it in a clean food trough in a clean pen. Later, when the young pigs begin to feed "on their own," give them some lime-water, too; it does them no harm as long as it is not used too freely. The lime-water is readily prepared by taking a tub or barrel, cleaning it out thoroughly, and soaking in clean water for a day or two. Then half-fill with clean rain water and put about half a bucketful of air-slacked lime in the barrel, and after stirring water and lime together, allow to settle for several hours. It will be noticed that a thin "scum" floats on the surface, and that the water is as clear as crystal. As long as this scum forms daily, the lime-water is good; and the barrel can be refilled after use. Stir the lime up occasionally, and it will be good for two or three weeks at

least. When the seum fails to appear on the surface, clean the barrel out, and start again with a fresh supply of lime and water. Never use an iron or tin container for this purpose.

Cleanliness is next to godliness in all matters relating to pig management. Common-sense methods of feeding and care are also golden rules, and a knowledge of the cause and effects of the common diseases to which stock are subject will be of the greatest value at all times.

Boiled Rice as a Remedy for White Scour.

An American breeder, writing recently on this subject, recommends boiled rice and the water in which the rice has been boiled as a cure for the trouble. This is a very useful remedy; in the case of very young pigs a dessertspoonful of warm rice water two or three times a day will suffice; it must be given in teaspoonful doses as a drench, and the suckers should be kept away from the sow for at least two hours after dosing. Weaners that still have a good appetite should be given both the boiled rice and the rice water, and no other food should be allowed while this is being given.

Further information in connection with this and other diseases of the pig and in connection with pig raising generally may be obtained in pamphlet form from the Department of Agriculture and Stock, Brisbane, at any time.

SIZE OF BREEDING PIGS.

L. A. DOWNEY, H.D.A., Instructor in Pig Raising.

On visiting many farms, one is surprised to see the small and inferior quality breeding stock being used to produce bacon pigs.

It is well known that one of the chief aims of the pig raiser is to get his pigs away to the bacon factories as quickly as possible in order to get quick and profitable returns.

The dressed weights for prime bacon pigs at the Queensland factories at present are 95 lb. to 120 lb.; that is approximately 140 lb. to 172 lb. live weight. If the farmer can get his pigs to this weight in five months instead of six months, it is quite evident that he will save one month's feed, labour, and risk on his pigs, and he will also have his returns one month earlier from each bunch of pigs sold.

It is quite possible to get pigs to these specified weights in five months. In fact, some of the prime baconers received at the Queensland factories now are less than five months old.

There are many factors which contribute to quick growth in pigs, the chief of which are:—Good quality breeding stock of large size and strong constitution; healthy and comfortable accommodation for the pigs; an ample supply of food of good variety and quality, together with proper management in breeding, housing, and feeding.

The point which seems to be most neglected on Queensland farms is the size of the breeding stock, both boars and sows. All other factors being equal, a small sow cannot be expected to rear such large and fast-growing pigs as a larger sow, although she may be just as prolific. Size will also be transmitted to the offspring by the boar. Therefore, if the farmer wishes to get the best results from his pigs, it is his duty to look to the breeders.

It seems quite a common practice of many farmers to mate their breeding sows when five or six months old; this practice alone is quite enough to spoil the chance of getting the best from their pigs.

The age at which to mate a sow will depend mainly upon her growth, but generally about nine or ten months is the best age, for a sow of this age is generally well developed and will grow into a large roomy sow.

The breeding age is not the only controlling factor in the size of the pigs, but the sow should be well fed while she is pregnant and while she is suckling her litter, for it must be remembered that at this stage she has to grow herself as well as feed her young.

The best age to breed from a boar is about the same as that of a sow, viz., nine to ten months, and the boar must be used carefully, only allowing him four or five services for the first six months.

The extra expense of keeping a sow on from six to ten months of age before mating her is negligible compared with the difference it will make in her offspring; this will be quite evident when it is remembered that a sow will rear approximately fourteen pigs per year for about six years, and all her pigs will be affected by her size.

It is sometimes argued that a particular sow which is very small is an exceptionally good breeder and good doer; in answer to that, it may be said that if that particular sow had all her present qualities with extra size she would be even a better pig.

It behoves the pig raiser to consider this important point and cull those small sows and boars which are all too common and replace them with well-bred pigs which have quality as well as size.

It must be borne in mind that early maturity is not everything in our bacon pigs. Other points to be considered in the ideal bacon pig are:—Weight, length and depth of body, good ham development, light development in the shoulder and jowl, fineness of bone, and firmness of meat, with a predominance of lean over fat.

INDIGESTION IN CALVES—SOME COMMON CAUSES.

Owing to the artificial manner in which most calves in dairying districts are reared, indigestion and its consequences—general unthriftiness, diarrhoea, and stunted growth—are very common. These troubles may be due to any one or combination of the following causes:—

Overloading the young animal's stomach through endeavouring to give sufficient nourishment to cause it to thrive in too few feeds.

Replacing full milk with skim milk or milk substitutes too early or too suddenly.

Giving the feed cold or only slightly warmed instead of at the normal temperature of milk fresh from the cow.

Sudden changes of food, as from skim milk to substitutes, and back again.

So feeding a bunch of calves that the little animals gulp it down as quickly as possible to prevent others from getting it.

Giving such a small ration that the calves are driven to eating rough forage and hay, &c., at a too early age.

In order to prevent disease in calves from improper feeding the following points require attention:—

Cleanliness in feeding, which should preferably be from metal receptacles which can be scalded out.

Separate feeding of the calves to ensure that each one gets a fair feed and is not unduly hurried.

Feeding the milk and other material at blood heat.

The gradual substitution of skim milk for whole milk, and the replacing of the nutritive material thus lost by meal obtained from cereals or other concentrated food.

Regularity in times of feeding and quantity of material used.

Gradual change of food when necessary, and gradual weaning.

The skim milk which is used should be as fresh as possible, since the longer it is kept the more likely it is to be contaminated and so cause diarrhoea. The skim milk, buttermilk, and whey obtained from creameries and factories is particularly dangerous, since the feeder has no control over the possible contamination of the material. It should be pasteurised before being used.

DINGO TRAPPING—AN EFFECTIVE LURE.

Mr. G. Herbert Merriman (Mount Lindesay) writes:—I was interested in your article on "The Dingo" in your February edition re trapping and decoying. The most successful trapper I ever met was on Galway Downs, west of the Cooper. He would get from ten to twelve dogs a night and his method was simple. He had a black dog which he had trained from a pup and he used to tie a tin on to the dog and the dog used to make water in this tin; he would then pour the urine into a large bottle with dogs' excreta, and would sprinkle a little of this where the trap was set, and I do not think he ever missed. He called the mixture "Racis mirabilis," and I consider the name was fully justified, for he uncorked the mixture to show me one day; this was over twenty years ago and I haven't forgotten the perfume yet—and never shall. He had got over 300 dogs in the district then, he told me, and was shortly to leave for a spell. I have come across many dog trappers in my travels in the West, but I would certainly give the award to this one.

ADJUSTING PLOUGH DRAFT.

The accompanying diagram, illustrating some of the principles of adjusting plough draft, is well worth reproducing from a recently published leaflet of the John Deere Company.

In operating your walking plough, see that the hitch is right and the share has the proper "suck" to ensure penetration.

Drawing No. 1 illustrates the result of a too-short hitch. The "heavy-line horse" is hitched correctly—the plough running at an even depth. The dotted line represents the same horse hitched closer to the plough. Note that the line of draft has been changed, as shown by the dotted line. This naturally pulls up on the plough beam and raises the plough point to such an extent that the bottom may be lifted entirely out of the ground or not run the desired depth. In this case the clevis should be raised.

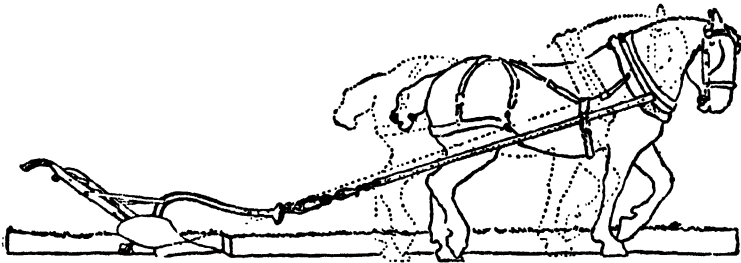


Fig. 1—Effect of too short a hitch.

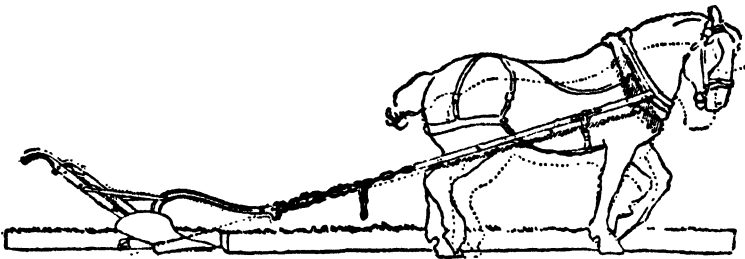


Fig. 2—Effect of small horses.

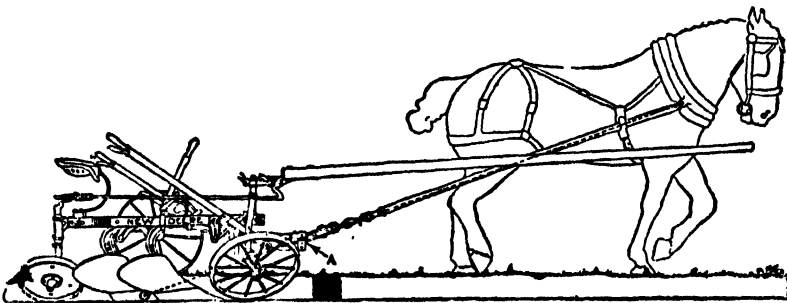


Fig. 3—Proper hitch for riding plough.

Too-long tugs will have an opposite effect. In this case the direct line of draft will be lowered proportionately to the length of the tugs, and the tendency will be for the horse beam to be pulled down. The result is a too-deep furrow. Lowering the clevis will remedy this condition.

Drawing No. 2 shows how horses of different size affect the work of the plough. The solid lines show the correct hitch. The dotted lines show the effect of a smaller horse with no change made in length of tugs. The line of draft is lowered at the horse's shoulder, as shown by dotted line, and there is a pulling down at the beam point. This makes the plough run deeper. Lowering the clevis will remedy this. Shortening the tugs also will correct the trouble.

A larger horse than the one shown by the solid line would have the opposite effect—there would be a tendency to pull the plough out of the ground—make it run too shallow or unevenly. Either lengthening the tugs or raising the clevis would correct this condition.

In addition to the preceding conditions that affect the running of the plough, very often the tugs are held up in the hip loops, thereby causing an uplift. Remove tugs from hip loops.

Attention to these matters will save trouble and will assure a good job of ploughing.

Getting the correct hitch is the most important adjustment on a plough. Be sure to read carefully the following instructions on hitching to a gang plough:—

Vertical Hitch Adjustment.

This refers to the up-and-down adjustment on the vertical clevis. (See "A" in illustration above.)

The correct hitch at "A" is the place where "A" is in a true line between circle on plough and point of hitch at the hame.

When ploughing deep or using tall horses, hitch higher at "A" than when ploughing shallow or using small horses.

When hitching horse strung out, hitch lower at "A" than when using four horses abreast.

Remember, if you hitch too high at "A," there is a down pull on the front end of the plough, and the rear end of plough will tend to come up.

If you hitch too low at "A," the draft will tend to lift the front end of the plough.

By changing the position of the clevis up or down, one or two holes at "A," a trial will generally show which hole places the clevis in a true line of draft.

Horizontal Hitch Adjustment.

Hitches are adjustable horizontally for the purpose of accommodating the position of the horses and the various sizes and types of eveners. Therefore, the cross-hitch is very long and has a large number of hitch positions.

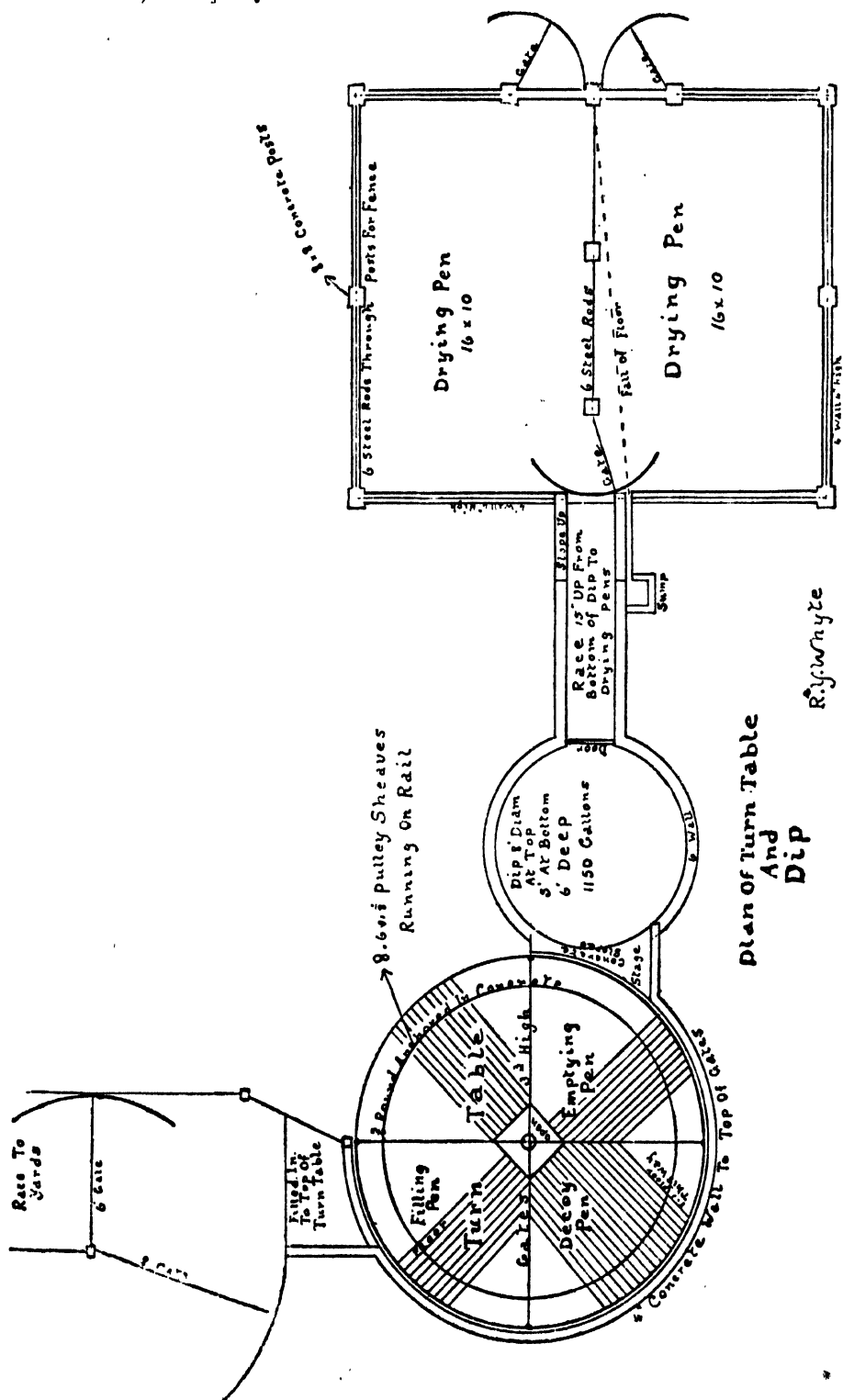
Move the clevis to right or left on the horizontal bar until furrow horse is accommodated. If hitched too far to left, plough will not take enough land; if too far to the right, plough will take too much land. Correct by changing hitch a little.

DIPPING MADE EASY.

Many and varied are the devices for dipping sheep in operation, but surely the most novel idea yet tried out is one recently constructed for Messrs. Henderson Bros., Otapiri, Southland, New Zealand. Henderson Bros., in engaging a contractor to put in an up-to-date dip, gave him an idea of what they wanted in the way of drying pens, dips, yards, &c., and also suggested placing a circular pen between the dip and the race. This circular pen was to have a centre post with swinging gates that could be pushed round behind a few sheep, thus forcing them to a handy position opposite the dip. The builder at once saw the possibilities of the turn-table idea, and on suggesting it to Messrs. Henderson Bros. had it accepted without delay. The work then went ahead on the new idea, and resulted in the erection of what must be the most efficient outfit of its kind in Southland to-day.

Some Details.

Of course, the chief novelty is the turntable, which, as will be seen from the accompanying sketch plan, is placed between the race and the dip. The turntable consists of a wooden platform set on a suitable number of pulley sheaves which runs on a rail anchored in a band of concrete 6 in. wide under the table. The top of the turntable is divided into four compartments by means of fixed gates or hurdles, which are filled with sheep in rotation. When the first compartment filled is in position opposite the dip No. 3 pen is at the filling point and No. 2, already filled, is between the two; this goes on continuously, there being a "decoy" pen always



between the filling and emptying points. A concrete wall as high as the gates partially surrounds the turntable and so completes the enclosure as each compartment swings round. Each compartment will take ten or twelve sheep at one time without difficulty.

The advantages claimed for the invention are:—

1. The turntable does away with the hard work of forcing the sheep into the dip.
2. The decoy pen acts as an inducement for incoming sheep, making the task of loading a comparatively easy one.
3. A saving in manual labour, reducing dipping to two or three men instead of four to six.
4. Of great assistance in dipping valuable stud sheep or old ewes.

Since its completion Messrs. Henderson Bros.' dip has been a great source of interest to farmers from far and near, and one and all have expressed their appreciation of the idea. With the exception of the turntable and gates, the entire outfit is erected in concrete and steel, and looks as though it would last for a hundred years.—'New Zealand Farmer and Stock and Station Journal.'

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY, 1928, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING January, 1929 AND 1928, FOR COMPARISON.

| Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | | Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | |
|-------------------------|-------------------|------------------------|-----------------|-------------|----------------------------------|-------------------|------------------------|-----------------|-------------|
| | Jan. | No. of Years' Records. | Jan., 1929. | Jan., 1928. | | Jan. | No. of Years' Records. | Jan., 1929. | Jan., 1928. |
| <i>North Coast.</i> | | | | | <i>South Coast—</i> | | | | |
| | In. | | In. | | continued: | In. | | In. | |
| Atherton ... | 11.59 | 27 | 17.03 | 7.73 | Nambour ... | 9.98 | 32 | 9.46 | 8.21 |
| Cairns ... | 16.23 | 46 | 26.00 | 5.84 | Nanango ... | 4.66 | 46 | 9.51 | 4.33 |
| Cardwell ... | 16.45 | 56 | 28.01 | 5.18 | Rockhampton ... | 8.57 | 41 | 3.89 | 3.40 |
| Cooktown ... | 14.25 | 52 | 24.27 | 2.08 | Woodford ... | 7.89 | 41 | 13.22 | 5.19 |
| Herberton ... | 9.61 | 41 | 14.40 | 5.31 | | | | | |
| Ingham ... | 15.76 | 36 | 31.09 | 7.29 | <i>Darling Downs.</i> | | | | |
| Innisfail ... | 19.81 | 47 | 35.58 | 14.80 | Dalby ... | 3.38 | 58 | 1.81 | 0.86 |
| Mossman ... | 14.08 | 15 | 36.38 | 8.81 | Emu Vale ... | 3.35 | 32 | 2.48 | 2.90 |
| Townsville ... | 11.27 | 57 | 15.96 | 7.93 | Jimbour ... | 3.75 | 40 | 1.53 | 1.49 |
| | | | | | Miles ... | 3.90 | 43 | 1.28 | 1.46 |
| <i>Central Coast.</i> | | | | | Stanthorpe ... | 3.64 | 55 | 1.73 | 3.95 |
| Ayr ... | 11.28 | 41 | 25.38 | 3.82 | Toowoomba ... | 5.05 | 56 | 5.00 | 4.15 |
| Bowen ... | 9.90 | 57 | 33.32 | 4.38 | Warwick ... | 3.61 | 63 | 2.43 | 2.96 |
| Charters Towers ... | 5.68 | 46 | 8.15 | 1.54 | | | | | |
| Mackay ... | 14.35 | 57 | 16.64 | 4.41 | <i>Maranoa.</i> | | | | |
| Proserpine ... | 15.55 | 35 | 39.62 | 7.31 | | | | | |
| St. Lawrence ... | 9.67 | 57 | 8.14 | 8.64 | Roma ... | 3.33 | 54 | 1.24 | 1.79 |
| <i>South Coast.</i> | | | | | | | | | |
| Biggenden ... | 5.41 | 29 | 5.65 | 4.04 | <i>State Farms, &c.</i> | | | | |
| Bundaberg ... | 9.30 | 45 | 4.21 | 2.77 | | | | | |
| Brisbane ... | 6.47 | 78 | 4.60 | 6.15 | Bungewongorai ... | 2.14 | 14 | 0.80 | 0.92 |
| Caboolture ... | 7.84 | 41 | 6.62 | 6.83 | Gatton College ... | 4.22 | 29 | 2.46 | 3.52 |
| Childers ... | 7.96 | 33 | 6.37 | 4.45 | Glindie ... | 3.80 | 29 | 1.30 | 4.34 |
| Cromahurst ... | 12.81 | 35 | 12.37 | 10.39 | Hermitage ... | 3.82 | 22 | 3.23 | 3.18 |
| Eak ... | 5.76 | 41 | 10.74 | 4.53 | Kairi ... | 7.96 | 14 | 21.97 | 4.33 |
| Gayndah ... | 4.64 | 57 | 10.53 | 3.25 | Sugar Experiment Station, Mackay | 14.63 | 31 | 16.33 | 3.48 |
| Gympie ... | 6.76 | 58 | 9.34 | 3.60 | Warren ... | 5.56 | 14 | 0.44 | 2.74 |
| Kilkivan ... | 5.48 | 49 | 13.43 | 5.65 | | | | | |
| Maryborough ... | 7.62 | 56 | 4.18 | 6.41 | | | | | |

GEORGE E. BOND,

20th February, 1929.

Divisional Meteorologist.



PLATE 80.—MR. WILFRED L. OSBORNE.





A well-known South Burnett farmer, who has been associated with every forward movement in that rich and progressive district.

In 1907, while still a lad in his teens, he took up land near Murgon, and has since then pioneered seven farms in virgin scrub country, developing each one from a wilderness up to the point of efficient, profitable, and continuous production. A rural economist, trained in the best and hardest of schools, and an earnest and tireless fighter for farmers' rights, Mr. Osborne has been at the front in every move for the betterment of the agricultural industry, and the farmers' organisations in the South Burnett have benefited greatly through his energetic and successful advocacy of their aims.

On the inauguration of the Queensland Producers' Association in 1923 he was elected to the first South Burnett District Council, and in two later elections under the ward system he was returned unopposed as representative of the Local Producers' Associations of the Murgon district, in co-operative matters one of the foremost districts in Queensland. Mr. Osborne has also served on the Murgon Shire Council, as District Secretary of South Burnett L.P.A.s, and as District Delegate to the State Conference of Primary Producers, and the Council of Agriculture.

As an advocate of the pooling system of maize marketing and complete rural organisation Mr. Osborne is regarded as one of the foremost of our farm leaders.

NEW SERIES OF HORSE AND CATTLE BRANDS.

The Brands Branch of this Department advises that horse and cattle brands from a new series are now being issued. The brands are composed of two block-type letters similar to those issued in the first series and a design. The four designs included in the series are    ; and for purposes of identification are referred to as the "Cranking handle," "Spur or rowlock," "Tent," and "Triangle."

The "G" series of brands, which has just been exhausted, contains similar shaped letters and numerals, but in that series the designs are "Diamond," "Heart," "Spade," and "Cross."

Both the "G" and "H" series (the new one) contain 12,096 brands, and up to the end of February, 1929, over 80,150 three-piece brands had been registered in Queensland since the first brand, CA1, was issued in the name of the Hon. Louis Hope, Kilcoy, on the 1st May, 1872.

INTERSTATE BUTTER TRADE.

At a meeting of representatives of the Sydney butter distributing houses it was decided that all the members present would, for a period of three months, or until the plan for the control of interstate trade had been formulated, refrain from sending butter to Queensland from New South Wales.

The meeting was sponsored by the New South Wales Butter and Cheese Exporters' Association, and its president (Mr. A. C. McCartney) presided. The chairman said that the meeting had been called to confer with the chairman of the Queensland Butter Board (Mr. J. Purcell), who had already met the trade in Melbourne.

Mr. Purcell said that his board thought that if the interstate trade in butter could be controlled it would be in the interests of the whole industry. They had decided, therefore, as a board, to stop the flow of butter out of Queensland into other States until such times as a shortage occurred in the supply in a neighbouring State. Mr. Purcell referred to the present wasteful methods in Melbourne. He saw two vessels

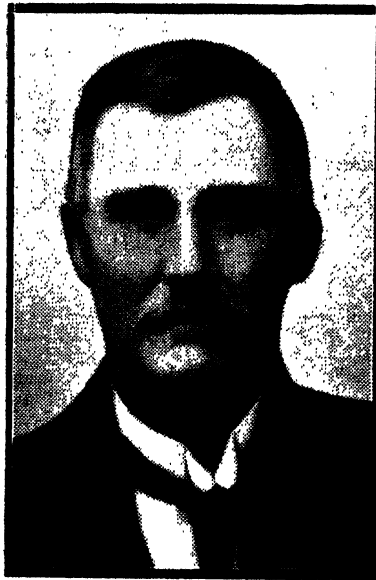


PLATE 81.—MR. JAMES PURCELL,
Chairman of the Queensland Butter Board.

lying almost side by side, one of which was discharging 2,000 boxes of Queensland butter for Victorian interests, while the other was loading Victorian butter, practically the same quantity, and this was being shipped to Brisbane. Such handling of a perishable article, he said simply meant that producers had to pay an unnecessary cost for the double transfer of the commodity.

Consideration was given by the meeting to the West Australian trade, which required about 3,000 boxes a week. It was stated that the question of a basic price had been arranged at the Melbourne meeting, and that it was understood that Western Australia would find that future shipments would arrive there at the same rate from the Eastern States.

In reply to a question whether it had been agreed that Victoria should not send butter into New South Wales, Mr. Purcell said that he took it that the agreement applied to Victoria, New South Wales, and Queensland.

*Pioneering and all the Work
that follows—*



—is a Job for
**VOCO
POWER**

To-day, swishing and crashing, scrub and "whipstick" mallee go down before the powerful advance of roller, tractor, and . . . VOCO Power Kerosene.

The Modern Pioneer has, in the tractor, a machine that will stand up to the roughest, toughest, "bullocking" jobs on the land . . . just the sort of jobs that most need the powerful, "knock"-less energy you will find in VOCO Power.

Sustained power in the toughest pull without a 'ping' is what you want . . . and get when you use VOCO.

Obtainable at all Vacuum Oil Depots throughout Australia and New Zealand

**VOCO POWER
KEROSENE**

Vacuum Oil Company Pty. Ltd.

MARKETERS ALSO OF GARGOYLE MOBILOIL

Another Proof of Success—

The following letter from Mr. D. Baldie, "Dyburgh," Undina Siding, Cloncurry, Queensland, proves beyond doubt the satisfaction obtained from the use of VITA-LICK—

"28th November, 1928.

"We have a very severe drought here. I have a great opinion of Vita-Lick to give sheep strength in time of drought. Many of my sheep were in a dying condition about the end of September: up to that time I kept my sheep supplied with coarse salt only. My sheep had a dull sickly look; they were hollow. A lot of them would hang about the water and would not drink properly. I commenced to use Vita-Lick about the end of September. I commenced with one bag of Vita-Lick Concentrated to one bag salt. I kept my sheep well supplied with this mixture and am very pleased. My sheep have now a fresh look; they are all in good health, though most of them are very poor. Vita-Lick has made them all strong. I am an old sheep man and I must say I have never seen sheep so poor with so much strength on drought stricken country. Had I continued to give sheep salt only, many of them would be dead by now. I WISH I HAD KNOWN THE VALUE OF VITA-LICK IN THE 1926 DROUGHT."

This proves that the constant use of VITA-LICK is a most payable proposition.

Use "D" formula for Dry Feed. Use "G" formula for Green Feed.

VITA-LICK LIMITED

107-109 Kent Street :: SYDNEY

Interest-Bearing Faith

The person who is faithful to his Savings Account, year after year, permitting compound interest to add its cumulative power, has a far better chance of acquiring something substantial than the person who habitually speculates on "Sure Things."

The race is rarely to the swift.

One thing is certain—there is no magic about accumulation, there are few short cuts, and most of those are dangerous.

It is best after all to find out the surest way, the cumulative way, and then stick doggedly to it—with interest added at 4 per cent. per annum.

Every Post Office is a Savings Bank Agency.

Commonwealth Savings Bank of Australia

GUARANTEED BY THE COMMONWEALTH GOVERNMENT

FAT LAMBS.

THE TYPE OF EWE TO BREED FROM.

When considering the type of ewe from which to breed fat lambs, several aspects of the case must be considered, and perhaps the most important of these is availability. Because of the greater numbers bred (writes the Sheep and Wool Expert of the N.S.W. Department of Agriculture) it is always possible to buy Merino ewes, but the same cannot be said of comeback and crossbred ewes, good even lines of which are often very hard to obtain. This fact must be borne in mind when considering the purchase of ewes for lamb-raising, and it indicates that, whether suitable or not, in numerous cases the Merino ewe will be used because other types of ewe are not available. As a mother for the production of a first-class export lamb under average conditions, the pure Merino ewe cannot be regarded as entirely satisfactory. Merino ewes mature slowly, and, compared with the crossbred ewes, do not give high lambing percentages; they are not good mothers, have a smaller supply of milk, and when mated with British breed rams experience more difficulty in lambing—all of which are important points in the production of fat lambs. The ideal ewe is a big-framed, roomy, early maturing type with a good milk supply, giving a high percentage of lambs and looking after the lambs properly.

Experience has shown that the lamb from the Merino ewe by one or other of the longwool breeds does not altogether come up to the requirements of the export lamb trade at the weaning stage. The lambs dress on the light side (25 to 28 lb.) and are rather slab-sided and leggy, and generally are not as compact and symmetrical as is desired. When the Merino ewe is mated direct to a ram of one of the Down breeds the resulting lamb is still less satisfactory, there seeming to be such a great difference between the two breeds that they do not nick well, and the result is unevenness, both in the individual and in the group of lambs; besides this, the lambs are slow in maturing. The results with the Dorset Horn (especially in the hotter districts and where big-framed ewes are used) have been much better than those obtained with the black-faced breeds.

Despite the disabilities mentioned, the fact remains that often Merino ewes are the only ones obtainable, and in such a case big-framed, plain-bodied ewes should be selected, and the best results will usually be obtained by joining with them rams of one of the longwool breeds.

The breeding propensities of the ewe must also be considered. In the hotter districts an early mating is desirable so that the lambs can be sold before the grass seeds begin to be troublesome in the spring. It has been found that crossbred ewes will not mate readily in the early part of the summer or during the hotter months in those districts where an early mating is desired, and this is specially noticeable when the ewes have been procured from a cooler district. An endeavour should be made to secure ewes bred under similar conditions to those where they are to be run, but in certain districts the crossbred is unsuitable for the above reason. Comeback ewes will breed more readily than crossbreds, while the Merino will breed almost at any time; and, considering the fact that Merinos can always be procured, it can be assumed that Merino ewes will be used in greater numbers in the production of fat lambs, despite the disabilities under which they labour as compared with the crossbred ewe, and the farmer who has to use them will be able to set off against the greater value of the lamb from the crossbred ewe the advantage of this earlier mating—the early dropped lambs which are obtained with the Merino.

The added value of the fleece of the Merino ewe will also help to balance the scales, although it has to be remembered that when run continuously on cultivation ground, the wool of the Merino depreciates to a greater extent than the wool of crossbreds under like conditions.

Under average conditions it must be granted that the best fat lamb is produced by mating one of the Down breeds with a first cross longwool-Merino ewe, and to secure the early maturing lamb desired, the best combination of breeds has been found to be the Dorset Horn ram mated with the Border Leicester x Merino ewe. The Ryeland is also showing great promise when mated with a first cross longwool x Merino ewe, but is only recommended for use in the cooler districts, or where mating does not take place early in the summer.

As mentioned previously, it is not always possible to secure the exact type of ewe required, but an endeavour should be made to get an even flock. Comeback ewes will give a more valuable fleece than the crossbred, but being nearer to the Merino and smaller in frame will not give such an early maturing lamb. The lambing percentage from comeback ewes will not be so good as from crossbred ewes.

CO-OPERATION.

ROMANCE OF THE ROCHDALE MOVEMENT.

"Surrounding the performance of the many little services so necessary to fill the wants of even the smallest community is a tremendous waste in money and effort. In the larger towns this is particularly noticeable. The further outback one travels the less this interdependence applies, but there is a corresponding loss of leisure time, or restriction in these services. Again, two-thirds of the farmer's income is spent in providing himself with implements, plant, seed, and the little comforts of life. Of what use is it to double the price of butter if the money gained from this source is wholly lost or dissipated in buying the necessities of living?"

In an address of which the foregoing was substantially the text, Mr. R. J. Grierson, manager of the Co-operative Wholesale Society, Newcastle (N.S.W.), urged upon a recent gathering of North Coast farmers the formation of co-operative community centres, and incidentally gave an interesting account of the origin and growth of the Rochdale consumers' movement. The movement was born at Rochdale, Lancashire, in what had been called the "hungry forties," conceived of dire necessity, when most of the population were struggling under an insupportable load of poverty. It had since been adopted by almost every nation in the world without modification, and had proved worthy to be ranked as one of the great world-wide social movements.

A Romance of Commerce.

The history of the movement was one of the most fascinating stories in the world. In 1844 a little band of twenty-eight Rochdale weavers met together to discuss (in their words) a way out of their misery. Their idea was to formulate a plan for a better existence. It was easy to devise a plan, but how to put it into practical operation was quite a different story. Among the many suggestions offered only one seemed practicable. This was to open a store, the profits of such to be returned to the people, less an amount to be retained for education.

According to the original plan it was decided that operations be commenced with a grocery store, the capital to be subscribed in shares of £1 each; that interest paid on this capital should not exceed the legal rate; that the shares should always remain at par; that the control of the business should be democratic—that is, one man one vote, regardless of shareholdings, and the voting to be done in person, never by proxy; and, lastly, that the selling price of goods to members should be at current market rates, and all sales for cash, but—and herein lay the distinctive feature which marked the co-operative from the privately owned store—the margin between wholesale and retail prices, commonly called profits, was to be returned to the consumers in proportion to the purchases, and 2½ per cent. of these profits were to be devoted to education. It was on record that a journey of 20 miles was required to gather the initial contribution of 2d. per member, and this task was undertaken in turns by the original pioneers. Out of this small weekly sum of 4s. 8d. had grown the British Co-operative Bank with its present turnover of £520,000,000 per annum.

A Start in a Small Way.

The store was commenced in such a humble way that the original stock only covered four items—namely, flour, sugar, butter, and oatmeal—and so embarrassed with their small beginnings were these men that it took a lot of courage to take down the shutters and open the shop. The story ran that the shop was opened amid the jeers and catcalls of the population of Toad lane. Although it took a year to raise £28, the pioneers were not daunted, for their community store was to be only the initial step to bring about equity in industry, and to these enthusiasts the store was not an end, but merely the means towards securing the pecuniary benefit and improvement of the social and democratic conditions of its members. So enthusiastic did they become that further objects were included in the plan, as being preparatory steps to the final one, which was no less than this—that as soon as practicable the society should proceed to arrange the powers of production, distribution, and exchange, and that the opportunity be created to allow of unrestricted co-operation on the part of all the members for every purpose of social life.

An International Organisation.

Few people grasped the immensity of the vision displayed in formulating the above plan, observed the speaker, for out of that effort had grown in Great Britain an organisation with a membership exceeding five and a-quarter million householders, amounting to one-third of the population. In 1926 the capital invested was £100,000,000, the sales were £185,000,000, while 210,000 persons, earning £19,000,000, were employed. And it was notable that the idealism of the foundation members had not been lost, inasmuch that in the year referred to over £180,000 was spent in education.

The enormous growth of the movement was well illustrated by the magnitude of its present operations. The British National Wholesale owned the largest boot factory in the world, it operated the largest textile mills, and its eight great flour-mills were the largest takers of Canadian and Russian wheat, while last year it absorbed and financed the whole wheat pool of Western Australia. It owned 35,000 acres of tea plantations in Ceylon and 33,000 acres of farm lands in Canada; it owned collieries and steamships, and had vast tracts of palm nut groves in Sierra Leone for the production of oil nuts for soapmaking. Such had been the international development of the movement that no less than 50,000,000 householders in thirty-two countries had been registered as active adherents to the principle, and a recent development had been the formation of an International Wholesale, having for its object the transfer of co-operative production through co-operative channels from one country to another.

THE SIXTH TRACTOR SCHOOL AT GATTON COLLEGE.

The Queensland Agricultural High School and College, in conjunction with the Council of Agriculture, will hold the Sixth Queensland Tractor School from the 24th March to the 5th April, inclusive. The course will cover lectures, demonstrations, and practical work in the care, adjustment, repairs, and driving of many makes of tractors.

At the last school there were in use Fordson ('tween wheels plough), Fordson (with rotary cultivator), Fordson (crawler), Advance (crude oil), Hart Parr (two), Case, Massey-Wallis, McCormick-Deering, Cletrac, Caterpillar, Cletrac (College owned), British Wallis (College owned), Fordson (College owned). It is expected that other tractors also will be represented this year.

The cost to each farmer will be £3 9s. 6d., which will cover all instruction costs, board and residence, and recreation fee.

The Railway Department will grant attending farmers one-half excursion rates each way on presentation of a certificate from the College.

The College will provide power kerosene, the railage on tractors from and to Brisbane, and free board and residence for tractor mechanics.

Farmers should book to College station and ask the guard to stop, previously advising the College of the train by which they will travel.

Farmers will need to bring blankets, sheets, mosquito net, pillowslips, towels, soap, mirror, and other toilet requisites.

No farmer will be allowed to confine his attention to a particular tractor, but must work each in turn. Should he desire more work on a particular tractor, he will have to arrange it in his spare time.

Applications from farmers wishing to attend the school will be received from now onwards; early applications will be given preference. Any further particulars will be supplied on request.

A VALUABLE JOURNAL.

A Yamsion reader (enclosing a year's subscription to the Journal for a neighbour) writes (31st January, 1929):—"For myself, I can only say that it is a very valuable publication."

THE CULT OF THE COLT.*

By "U 9 L."

VI.

EDUCATION.

Some fault may be found that so far our colts have behaved themselves on conventional lines. They have, and the reason is that we deal with the majority first. We'll handle a snorter or two later, and now we will go on with the orthodox. We have gone through all the primary lessons of a colt's education, building a foundation for his knowledge, and, roughly, that is repeated over and over again. Specially does the tying up devolve into a lesson which is boring in its irksomeness. While we have any batch of youngsters in hand, as soon as they come to the yard in the morning, it is the same old routine with but little variation: catch him, rub him down, have a yarn with him, slip the halter on him and tie him to a stout post or tree. There that little fellow has got to stay, resting alternate legs and swishing the flies till there's no doubt he is heartily sick of the whole course. He may be tied for five hours just to prove to him in a momentary check that he has got to stay put when and where we leave him. That is the whole object of those hours of weary monotony. He cannot take any part of his education in tabloid form, and there are no short cuts to knowledge for him. He has to go through with it. But in gaps of time in between we teach other little lessons.

Leading—Building up the Colt's Confidence.

Of course, the colt has to learn to follow where we choose to lead. Honestly, there's nothing more gratifying than having a horse which goes without hesitation where you see fit to give it a lead. And if you want to add a few frills for your own pleasure, this is the period when we kill the time which drags. Let's teach a youngster or two to which we've taken a particular fancy to lead without reins. We have taught him to come to us when called, and on that same foundation we educate him to follow where we go. It's easy. I have always found a snap of the fingers impresses the colt in a more imperative manner than a click of the tongue, and if you build up gradually, always retaining your mastery of the situation, and the colt's confidence, you may go far. I mean by the former that you must never place yourself in a position to suffer a fall of prestige. For instance, if you get the youngster to follow you outside before you have him under command, then the chances are, as soon as you go through the gate, the colt will lift his tail above his back and leave you. That smashes all the good your teachings have produced. See to it, when he does think he can escape, that it is only a partial escape which is his—in the big yard or a small paddock, for instance. Then when you have got him again without trouble, and when you bring him to you with a run, that horse begins to think there is something wonderful about you which is worth attention. In this, and to let you know what can be done, let me relate a little story, without indulging in any of the "when I was younger." I had a little grey mare which I'd ridden for five or six years, and there was almost a perfect understanding between us. She'd follow anything I rode, running behind like a dog, and one day I was at the stock camp for dinner with my saddle horse tied to a tree and the little mare poking about. While we were having dinner a motor truck pulled in to the camp—one of those one-ton puffing abominations which paved the way for better machinery to follow. It stopped near where my horse was tied, and before it reached there I was standing beside my horse. The little mare, her ears pricked and her eyes shining with excitement and curiosity, was rubbing against me. In a spirit of flashness, bravado—call it what you will—when that truck started again I called to the mare, ran and jumped on the platform behind. The little thing never hesitated, and almost as I reached the platform of the truck she was beside me, snorting with pretended fear, her four legs braced wide, and with startled eyes peering over the edge of the truck at the ground slipping by beneath her. Now, I look on that sort of thing as being in the highest class of its own type of work—if you'll pardon me so praising my own teachings—and when a thing like that is done, then does a man feel that he has done something and that life is worth the living. Of course, you can't do it on any sort of animal at all. You've got to have the quality in the horse before results like that are achieved.

* From the "Pastoral Review" for October, 1928. Previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928), January and February (1929), Journals from the February, April, May, July, and September (1928), numbers of the "Pastoral Review."

Breaking.

Now let us get on with the breaking. That "breaking" is a hateful word, but it's a trade term, so I suppose we have got to use it. Among other places to which you've led your youngster is the stable. You have put him in a stall and left him there for a few hours for the good of his soul. That is all quite fit and proper. But when that little horse is in there, nervous and wondering what the dickens has happened to him, for the love of goodness don't let anyone stand and stare at him. That makes a horse self-conscious to the same extent that you would feel it, and he is no more comfortable under the process than you would be. Move about him if you wish, talk to him and try and make him feel at home, but don't treat him as an exhibit in a cage. The youngster does not like it. And above everything else don't stand still, look him fairly in the eyes and poke your finger at him. That may sound silly. You can take my tip, though, it isn't. If you will prove my words, please do so on a colt of no account. Put him in the stall, get him nervous and uncomfortable by gazing at him, and then poke your finger at him as I've told you not to do. Watch that youngster's eyes redden, see him move uneasily from foot to foot, and then snap your hand away quick as the colt comes with a charging rush at that pointing finger. Instead of annoying the animal, try and amuse it. Make it feel at home if you can, and bear in mind that it is only a little girl or boy horse you are trying to entertain. One game they seem to like above all others, and of which they never seem to tire, is for the man to place the flat palm of his hand over the lips of their mouth. Without exception they will immediately reach and try and take that hand in their open mouth. They can't. As they reach forward they push the hand further away, and they seem content to play that game indefinitely. And it is not wasted time! Anything which makes a bond of understanding between the breaker and his charges isn't lost effort.

The Early Morning Ride.

Now that the breaker has two, or three, or more youngsters in hand which have been ridden, and which are merely adding to their knowledge of man and his ways before faring out into the world, if that breaker's got the stuff in him, it is up to him to show his mettle. Every night let him keep one of his youngsters in and let him ride that colt after the horses in the morning. It takes doing, let me tell you, but is worth the trouble. It isn't any fool's job to turn out of a warm bed on a winter's morning, to go to the stall where that half-broken colt is shivering, to catch and saddle him and ride him round the paddocks to yard the horses. If there is a bit of a buck in that colt's repertoire then is the time he is going to show it, and there's going to be many a manifestation of temper when the rider wants the youngster to leave one mob of horses and go and gather another. I always think that early morning ride, uncomfortable though it is, is worth many times a lesson at any other part of the day. It has its little compensations, though. When a man's running horses he gets to understand the horse under him to a greater extent than any other opportunity gives, and in running his other breakers to the yard he gets a glint of their little peculiarities which later he may turn to his own profit. Anyway, for good work, it has to be done—that's the end of it!

Keep Your Hands Down.

Poets are born, not made, somebody is reported to have said. To a certain extent those more gifted with good hands receive direct from the gods their benefaction. Sympathy, understanding, and hands, and the greatest of these is —. I'll leave it to your individual selves, but I am strong on hands. What is the use of anything and everything in a horse unless he is responsive? Hands bring that, and hands almost alone are responsible for that perfection. The first thing, and as I have stressed previously, is lightness. Never for one fraction of a second put one portion of an ounce more weight on the horse's mouth than that necessary to achieve its purpose. An advice which has come down the ages is to keep your hands down. It's easy, easy and natural, once you have acquired the habit, and if any difficulty is experienced there is a simple way to accomplish it. If you keep your elbows in you must keep your hands down. Try it and see. There is no need to press with your elbows against your ribs, and there is no necessity to sit stiff and grim like a graven statue and to move in the jerky motions of a mechanical toy. If you let your elbows swing naturally and easily at your sides, not flapping them like a bird about to take flight, you will find, within reason, that your hands are forced into the proper position when you play on the reins.

Reins not Tiller Ropes.

Gauge the weights accurately and neatly, and don't use the reins as tiller ropes. They are not there for that purpose at all. The reins, really, are more in the nature of an emergency brake. More than half your steering, your desires and wishes are conveyed to your mount through your legs and your grip of the saddle with your thighs. How much does a skilled bicycle rider use his bars for steering purposes? You will find, should you care to note, that the bars aren't used for steering to any appreciable extent. The rider governs his direction by the swaying of his body. You will admit that, I think. Then, having admitted it, take counsel with yourself and think if a living piece of exquisite life isn't worthy of the same consideration as that shown a contraption of wires and hollow pipes. Picture to yourself, if you can, anything more deserving of the severest censure than that of a rider turning his horse by pulling on one rein alone, sitting bolt upright in the saddle, and with the hand holding that rein held out at right angles to his body. You have seen it, and so have I, and in your anger you have, like myself, called down the curses of both the regions beyond on the man who has attempted to exalt his paltry being by posing as the master of a horse. The proper place, and the only place, within reason, for all rein work is just a shade above the pommel of the saddle, and not more than an inch or two on either side of it.

When the Job is Finished.

Now, before leaving this horse which we have broken, let us deal with a few odds and ends. As I have said before, the time to impose on a colt all the new sensations of his life is the time when he is in the breaker's hands. Though he may never wear shoes, that's the time to lift up all his feet and go through the mock pretence of shoeing him, the time to flap all sorts of unnecessary gear over him, to drive him in a pair of blinkers and let him drag something round the yard. All those things the colt has to meet and accustom himself to them by familiarity. And cruellest thing of all, and though your heart bleeds for the baby horse which you've taken under your wing, he has got to have the hobbles on him. This is awful, and almost you writhe in agony in sympathy with your colt's bounds. But it's got to be done, and it is all educational.

And then when you pass your little fellow into alien hands, your work completed, with a great feeling of sadness you watch the little chap leave your loving care and break for ever the bonds of sympathy and affection which you have built up. He goes gaily, not knowing what is ahead of him, and you spit on your hands and go to another fellow waiting you in the round yard.



Photo.: Jean Easton.]

PLATE 82.

"Along the Track that Leads to Home."—An Apple-tree Avenue on Coochin Coochin.

AGRICULTURE IN THE NORTH.

The Acting Secretary for Agriculture and Stock, Mr. T. Dunstan, has received the quarterly report from Mr. N. A. R. Pollock, Northern Instructor in Agriculture, Townsville, on agricultural matters generally (apart from sugar-cane) in the Northern portion of the State, and of which the following is a summary:—

AS a result of the recent favourable rains prospects generally in the Northern areas are good. Particular mention is made of the Muttaborra, Winton, Mackinlay, Julia Creek, Richmond, and Hughenden districts, and to the fact that, owing to the improved condition of pastures, graziers are busy bringing back their sheep from agistment elsewhere, also that hand feeding has entirely ceased in those localities.

In the Northern Division the months of September, October, November, and portion of December usually experience insufficient rainfall to permit the growth of crops except under irrigation, and sowings are not generally made until the wet season begins.

Maize.

It is estimated that approximately the same area will be cropped on the Tableland as in the previous year. Indications point to the prospects of a heavy crop should the season continue propitious. Approximately 1,000 acres of forest country near Tolga have been reserved, and are sown with the new variety of maize (Durum) bred by the Department of Agriculture, and selected particularly for its suitability to the climatic conditions usually obtaining on the Atherton Tableland. On the coastal areas no increase in the area under maize is indicated.

Potatoes.

Crops on the Tableland will probably show a slight increase in area, and under the favourable conditions now being experienced should show better yields than those of the previous two years. The coastal crops which are usually planted in April cannot at present be forecasted.

Peanuts.

Seasonal conditions suggest a better average yield over the area planted, which is comparable with that of the previous season.

Truck Crops.

Indications point to the possibility of there being a slight increase in the area devoted to such crops as pumpkins, tomatoes, and cucumbers in the Lower Burdekin, compared with that of previous seasons, but, as sowings usually take place in February and March, at this early stage it is impossible to definitely forecast to what extent the area will be increased.

Green Fodder Crops.

Slight increases in the total areas on the Tableland and coast are expected in these for grazing-off purposes or for conservation as fodder in the form of ensilage. A certain proportion of the area will no doubt be utilised for green-manuring purposes.

Increased interest is being displayed in the matter of growing fodders in the Western country, and in the Stamford, Richmond, and Winton districts areas aggregating 150 acres have been sown with sorghums, cowpeas, and velvet beans in anticipation of being able to conserve those crops as ensilage should the present favourable weather conditions continue.

Tobacco.

Increased interest is being taken in this crop as the outcome of the encouraging results obtained from last year's trials of pipe and cigarette tobacco in the North, and commercial areas of 4 acres on Hervey's Range, 1 acre at Charters Towers, and $\frac{1}{2}$ acre at Pentland are contemplated. Small experimental trials are being made by interested individuals in order to secure experience for growth on a larger scale should this be eventually recommended.

Regarded generally, present agricultural prospects in the Northern Division are excellent, and greater returns from present growing crops are anticipated than was recorded for last season's crop, at least for this particular season of the year.

Answers to Correspondents.

BOTANY.

From the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.

Giant Couch.

W. McK. (Sexton, Kingaroy Line)—

Your specimen is *Panicum muticum*, or Para Grass, generally known in Queensland by its botanical name or as Giant Couch. It is a very valuable fodder, relished by all classes of stock. It does particularly well in districts with a high rainfall, such as the Atherton Tableland, where it is regarded as an important dairy grass. Generally it prefers rather moist country and is not particularly drought-resistant. It has considerable value as a soil binder along the banks of rivers.

Wild Mint—Chicory.

INQUIRER (Allora)—

- (1) *Salvia lanceifolia*, the narrow-leaved Sage, more commonly known in Queensland as "Wild Mint." This plant is a native of the United States of America and Mexico and has been naturalised in Queensland for some years past, first making its appearance in the Pittsworth district. It has now spread to other parts of the Downs and threatens to become a bad weed. We do not know the exact methods of propagation of the plant and therefore cannot give you any very definite instructions as to eradication. With regard to its poisonous properties—this is a popular opinion in Queensland, but there is no record of the plant being poisonous in its native country and we have no definite information based upon feeding tests. Feeding tests would probably be the only means of finding out anything definite on this point.
- (2) *Cichorium intybus*, "Chicory."—This is the wild form of the cultivated Chicory. The plant is very widely spread in the temperate parts of the world, and in Australia and the United States of America is regarded purely as a weed and a rather troublesome one at that. Under these circumstances its taproot becomes thin and worthless. In Europe the plant is cultivated to a considerable extent for commercial Chicory and the young leaves are bleached and used as a salad. Spraying is not particularly successful, and the only satisfactory means of control is deep cutting below the crown. Sometimes when the ground is sufficiently soft it may be hand pulled.

Western Plants Identified.

E.J.T. (Charleville)—Your specimens are—

1. An advanced specimen of *Trianthema decandra*, commonly known as Hogweed, very common in Queensland, and not known to be poisonous in any way.
2. A young growth of Hogweed (*Trianthema decandra*).
3. *Boerhaavia diffusa*, commonly known as Tar Vine, very abundant in Queensland and New South Wales. It has some reputation as a fodder.
4. The specimens in this package are only seedlings that have been eaten off and are rather difficult to determine. We should say, however, the package represents a mixture of seedlings of Saltbush (*Atriplex* spp.), Tar Vine, and perhaps Hogweed.
5. *Morgania glabra*, a small plant very common in Western Queensland and New South Wales, but for which I have not heard a common name. It is not known to be harmful or poisonous in any way.
6. *Buellia australis*. The same remarks apply as to No. 1.
7. *Euphorbia Drummondii*, the Caustic Creeper. The general characteristic of poisoning by this plant is a marked swelling of the head and neck. It has, however, lately been shown to sometimes produce a prussic-acid yielding glucoside, and if eaten then in quantity by stock when hungry may cause death. Generally speaking, however, paddock stock are little affected by it.

Grasses Identified.

R.W.M. (Bundaberg).—Your specimens have been determined as follows:—

1. *Eleusine indica*, the Crowsfoot grass. This grass is very widely distributed over the warmer regions of the world. Like some of the Sorghums, it possesses a prussic-acid yielding glucoside. The glucoside is quite well developed in Queensland plants, but we have had no very definite cases of poisoning by it.
2. *Eragrostis diandra*, a species of Love grass.
3. *Panicum sanguinale*, Summer grass.
4. *Paspalum dilatatum*, common Paspalum.
5. *Eriochloa annulata*, sometimes called Early Spring grass, at other times Dairy grass. Neither name is particularly suitable.
6. *Eragrostis leptostachya*, a species of Love grass.
7. *Andropogon pertusus*, the bitter or pitted Blue grass, rather unpalatable to stock.
8. *Sorghum* sp.—I should say the wild or native form of *Sorghum halepense*. This Sorghum genus is rather difficult to determine specifically in the absence of root specimens, the heads of the native Sorghum, Johnson grass, and Sudan grass being all so similar. The native Sorghum is a perennial with a tufted root stock with young buds generally being sent out, or in winter time perhaps dormant. Johnson grass has long white underground stems which cause it to be such a pest in cultivation. Sudan grass is an annual.

Northern Plants Identified.

J.L. (Townsville).—Your specimens from Home Hill are.—

1. *Albizia procera*, a tree very common in North Queensland and stretching through New Guinea and the Malay Archipelago to India and Ceylon. It is not known to possess any harmful property.
2. *Crotalaria laburnifolia*, a species of Rattle-pod. It has a somewhat similar distribution to the *Albizia*. Nothing definite has been proved against it, but, as you know, suspicion always attaches to plants of the genus *Crotalaria* owing to the known very poisonous qualities of some of the members.

So far as we know, Whitewood (*Atalaya hemiglauca*) does not occur in the Home Hill area, but it is quite possible it may be found in some of the drier scrubs of the area, as it is a tree with a wide distribution in Queensland.

“Glycine Pea.”

W.A.D. (Allora).—

Your specimen is *Glycine tabacina*, the Glycine Pea, a small legume common in the average mixed pasture in Southern Queensland. It is not known to be poisonous in any way, and is, in fact, looked upon as rather a useful fodder.

“Worm Seed.”

K.W. (Taabinga Village, via Kingaroy).—

Your specimen is *Chenopodium ambrosioides*, a species of Worm Seed, also known as Mexican Tea and Jesuit Tea. It is a native of the warmer parts of America, but is now widely spread as a more or less common weed in various countries. The seeds of this and of a closely allied species are the source of oil of chenopodium largely used in the eradication of hookworm.

Bitter Bark.

E.T. (West End, Brisbane).—

Your specimen is *Alstonia constricta*, commonly known in Queensland and New South Wales as the Bitter Bark or Native Cinchona. The bark has some value as a tonic. We have also heard of it being used successfully in some places as a tick wash. The bark is official in the British Pharmacopoeia, but the demand is very limited. It does not belong to the true Cinchona but to the family Apocynaceae.

PIG RAISING.

From the outgoing mail of the Instructor in Pig Raising, Mr. E. J. Shelton.

Paralysis of the Hindquarters.

C.D. (Haden)—

In making inquiries regarding sickness in animals it is advisable to furnish all details of feeding, housing, breeding, and other relevant information, so that a better idea of the conditions may be formed by the instructors, thus enabling them to diagnose the trouble more definitely.

Paralysis of the hindquarters may be caused by severe constipation, rheumatism, injury, and a few other items, but, from the particulars you give, the pig becoming suddenly paralysed, and appearing otherwise healthy and bright, may be injured by other pigs or larger animals, thus affecting the nerves of the hindquarters.

The best treatment you can give the pig is to put him in a dry, comfortable pen by himself, feed plenty of greenstuff, and if he becomes constipated give him a dose of castor oil in his feed. Then massaging the loins and rump with plenty of rubbing, and a mixture of turpentine and oil will help to stimulate the tissues.

The prevention of paralysis in pigs is summarised as follows:—Breed from sound constitutioned stock, feed a variety of wholesome foods, with abundance of greenstuff and water, run all pigs in grazing paddocks, and provide clean comfortable shelter. Rickets, a bone disease, which causes malformation of the bones, and in some cases loss of the use of legs, is sometimes mistaken for paralysis. To prevent rickets and keep your pigs healthy and making fast gains in growth, keep a mineral mixture always before them in a separate feed trough placed in a sheltered spot. A practical mineral mixture is as follows:—20 lb. hardwood ashes and charcoal, 15 lb. slaked lime or ground limestone, 40 lb. sterilised bonemeal, and 20 lb. coarse salt.

Planning a Piggery.

F.W. (Boonjie)—

The chief point in planning a piggery in Queensland is to provide plenty of paddock room, so as to have pigs of all ages on good grazing.

Under grazing conditions pigs not only develop better and are healthier and make cheaper gains in growth, but they can be topped off for market just as well on pasture, provided they are given sufficient concentrated feeds. Also, when topped off on pasture, there is little chance of the pigs being overfat, because of the exercise they get.

A useful type of piggery would be sufficient paddocks, say, $\frac{1}{4}$ to 1 acre in area, fenced with split palings and wire, or K wire; and in these paddocks have houses sufficiently large to protect the pigs in rough weather and give them shelter from rain, sun, and wind.

There is no need to go to any great expense over these sheds. A good type which is used on up-to-date pig farms is as follows:—6 feet high at front, 5 feet high at back, and 7 feet deep and any length, say, 9 feet long. Just the ordinary open-fronted shed with two ends and back boarded up with rough timber such as palings, an iron roof, and floor of 1-inch boards 1 foot off the ground to keep it dry. Round or sawn timber can be used for the walls, and any old iron for the roof. A shed of this size in each yard will accommodate pigs of any age, and if a sow and litter were to be locked up a few battens made into a hurdle across the front of the shed would do the job. The cost of the shed would be £2 to £5, depending on the class of material used, and it would be large enough for a sow and litter or for from fifteen to twenty young growing pigs. With paddocks and shelters like these either concrete or wooden troughs could be used and moved about occasionally to keep the ground from becoming too wet.

The open-fronted shed just described is durable, cheap, dry, and comfortable, and gets the full benefit of the morning sun right inside, and provides shade on one side all day.

Worms in Pigs.

A.L. (Frenchton)—

From your description—coughing, panting, and general debility in the pigs commencing when they are about three weeks old—they are apparently suffering from worms. The common round worm is present in most of our piggeries. The adult worm grows to about 10 inches long in the intestines of the pig, and lays thousands of minute eggs which pass through the pig and are deposited about the pens, yards, and troughs. These eggs are in time swallowed by the pigs when they eat out of dirty troughs or from muddy floors, or by suckers whose dam has been lying in the mud and whose udder is covered with filth. When they hatch the embryo worm enters the blood stream of the body, and in time passes through the lungs. While in the lungs these tiny worms, which cannot be seen by the naked eye, may set up coughing and panting and inflammation which may then lead to pneumonia. From the lungs they are coughed up and swallowed, when they pass into the intestines and increase in size and in turn lay eggs which pass out to infest more pigs. The effect of these worms is more severe on young pigs than on older ones. The first treatment for worms is to clean up the piggery thoroughly and remove litter regularly, keep troughs clean, use plenty of disinfectant, have the troughs so arranged that the pigs cannot lie or stand in them, and, above all, run the pigs in clean pasture paddocks instead of penning them in filthy yards or sheds.

Treatment.—Starve the pigs for twenty-four hours, then give them a small feed of skim milk containing turpentine and castor oil. For pigs weighing 100 lb. live weight, a sufficient dose would be one-third of a teaspoonful of turpentine and two tablespoonsful of castor oil. The size of dose must be regulated to suit the size and number of pigs to be treated. Mix the medicine thoroughly with the food, and see that each pig gets its share of the dose. This treatment must be repeated in exactly the same way two weeks later, for it must be remembered that the worms can only be killed by the medicine while in the stomach and intestines, and it takes about twelve days for the developing worms to pass through the lungs back into the stomach. Even when the young worms have passed into the stomach and intestines they are still often too small to be seen without a microscope. If this treatment is carried out to the letter, good results should follow.



Photo.: Jean Easton.]

PLATE 83.—“WHERE THE PELICAN BUILDS HER NEST.”

One of the little brooks that meander through the fertile Coochin Country.

General Notes.

Staff Changes and Appointments.

Messrs. J. H. Mitchell, P. Mitchell, and N. L. Miles have been appointed Temporary Inspectors under and for the purposes of the Diseases in Plants Acts, Mr. J. H. Mitchell until the 30th June, 1929, and Messrs. P. Mitchell and N. L. Miles for a period of three months. They will be stationed at Nambour, Currumbin, and Woombye respectively.

Mr. P. McCarthy, of Widgee, via Gympie, has been appointed an Honorary Inspector under the Diseases in Plants Acts.

Mr. G. P. Randles, of Kenmore, has been appointed Inspector of Slaughter-houses on probation.

Mr. F. A. Toop, of Holbrook, Nanango, has been appointed Officer under and for the purposes of the Animals and Birds Acts.

Mr. L. A. Burgess, Assistant to Analysts, Agricultural Chemical Laboratory, has been appointed Analyst, Agricultural Chemical Laboratory, Department of Agriculture and Stock, as from 12th February, 1929.

Mr. K. King has been appointed Inspector on probation under the Diseases in Plants Acts and will be stationed at Cooran.

Mr. C. D. Vere Hodge, of Cardwell, has been appointed Officer under and for the purposes of the Animals and Birds Acts.

Constable A. H. Holzberger, of Hebel, has been appointed Inspector of Slaughter-houses.

Mr. J. J. O'Brien, Glastonbury, via Gympie, has been appointed Honorary Inspector under the Diseases in Plants Acts.

Mr. F. J. Webber, of Burketown, has been appointed Government Representative on the Burke Dingo Board, and Messrs. F. Walden, A. J. Reid, J. Gaden, and E. G. Rothery have been elected members of that Board.

The Officer in Charge of Police, Monto, has been appointed Acting Inspector of Stock as from 23rd February, 1929.

The Inspector of Stock, Miles, has been appointed Government Representative on the Condamine Dingo Board, vice Mr. W. M. Nash, resigned, and the Inspector of Stock, Charleville, has been appointed Government Representative on the Warrego Dingo Board, vice the Police Magistrate, Charleville, relieved of the position.

Mr. Jas Carew, Acting Senior Instructor in Sheep and Wool, has been appointed Senior Instructor in Sheep and Wool, Department of Agriculture and Stock, as from 1st January, 1929.

Cotton Board Election.

The Cotton Board election resulted as follows:—

District No. 1. (North of Bundaberg on the North Coast Line)—

John Beck, Stanwell—Returned unopposed.

District No. 2. (Wowan District)—

Harry Reeves Brake, Wowan 140 votes

Charles George Young, Wowan 117 votes

District No. 3. (Callide Valley District)—

George Herbert Bradley, Argoon, via Rannes 137 votes

Alfred Charington Webb, Thangool 132 votes

District No. 4. (Upper Burnett)—

James Bryant, Chowey 174 votes

Edward James Basson, Three Moon, Monto 121 votes

District No. 5. (South Burnett and Lines to Grandchester)—

David Charles Pryce, Toogoolawah 89 votes

Charles Litzow, Vernor 39 votes

District No. 6. (Lockyer and Darling Downs)—

Ferdinand August Kajewski, Ma Ma Creek—Returned unopposed.

The successful candidates at this election will hold office as from the 19th February, 1929, to the 31st December, 1931.

Egg Board.

By regulation under the Primary Producers' Organisation and Marketing Acts the period of time during which the Egg Board shall, out of the proceeds of the eggs disposed of by that Board, make payments to each grower on the basis of the net proceeds of the sale of the commodity of the same quality sold by the Board has been prescribed to be from the 1st January, 1926, to the 2nd March, 1929.

Equalisation System for Butter Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts amending the original constitution of the Queensland Butter Board in so far as the system of equalising returns to factories is concerned. Practically no alteration has been effected in the system which has now been in operation by the Butter Board for some time, but the amendment to the Board's constitution merely makes clearer the actual system in operation.

Stanthorpe Fruit and Vegetable Levy Regulations.

By regulation under the Fruit Marketing Organisation Acts the Stanthorpe Fruit and Vegetable Levy Regulations, which originally applied to growers of fruit and vegetables in that part of Queensland situated within a radius of 40 miles from Wallangarra and railed from any railway station within that district from the 27th February, 1928, to the 25th February, 1929, have been further extended to apply until the 25th February, 1930. The levy in question is payable on the basis of the quantity of fruit and vegetables grown in the district aforesaid, and is at the rate of 5d. per ton and a proportionate part of 5d. for each fraction of a ton of weight of such fruit and vegetables railed in any one consignment from any railway station in the area mentioned. A minimum amount of 1d. is prescribed in respect of any one consignment by every grower.

The proceeds of the levy shall be used, firstly, in payment of any cost attached to the collection or recovery of the amount of such levy; secondly, in making financial grants to the various local associations in the district as may seem appropriate by the Committee of Direction; and thirdly, the balance to be paid to the Deciduous Sectional Group Committee to be used by it at its discretion.

School of Instruction for Pig Farmers at Gatton College.

Attention is called to the Annual School of Instruction for Pig Farmers to be held at the Gatton College during the period 10th to 20th June, 1929.

These schools have been organised to provide the means whereby farmers and their sons desirous of improving their knowledge of the business of pig raising may come together at a convenient centre for the purpose of meeting one another, of attending practical demonstrations, lecturettes, and indoor studies covering several phases of the industry. The success of the first school held last year is sufficient guarantee that this year's school will be equally as popular, and as early application is necessary it would be well for those interested to get in touch with the Principal of the College so that arrangements may be completed in ample time before the opening date. Provision has been made for accommodation, meals, and other services and those attending may be assured that their personal comfort will be well studied. The social side of the life of these schools is a special feature, while each evening before the lecture session begins, opportunity is offered for a free and easy hour for questions and answers on any agricultural or related subject. At these sessions officers attend who are associated with other branches of college life, and question time is one of the most interesting periods of the day for those of the school members who are interested in orcharding, dairying, and other pursuits.

The evening cinematograph and lantern lectures are also of much interest and value. At these lectures other college students attend while, as opportunity offers, prominent authorities on agriculture give addresses on appropriate subjects.

An added attraction will be a visit of inspection to the Metropolitan Bacon Factories, for here the several operations associated with the manufacture of pork products may be seen in full swing. Apart from the educational advantages of such a visit, the day's outing is looked forward to with a great deal of interest by those fortunate enough to attend.

The school fees are exceptionally reasonable and concession fares on the railways are available to those attending. Further particulars may be obtained on writing to the Principal, Queensland Agricultural High School and College, T.P.O. South, or from the Department of Agriculture and Stock, Brisbane.

Control of Arrowroot Flour.

The referendum to decide whether or not arrowroot flour should be placed under the control of the Arrowroot Board was held on the 1st February, with the result that eighty-one voted for the placing and sixty-seven against. As there was not the necessary three-fifths majority, the proposal lapsed.

A Tribute to the Journal.

Thus "Merrius," of Dalby (using the wires in the boundary fence for a harp):—If the hens won't lay and the cock won't crow; if you don't know what's the seed to sow, just send a bob—a shiny "deener"—for a book for which no price is keener; and the very next month after this wise move you'll get all the knowledge you want, by Jove!

Broom Millet Board.

By Order in Council made under the Primary Producers' Organisation and Marketing Acts the operations of the Broom Millet Board have been extended from the 11th March, 1929, to the 31st October, 1931, and Messrs. H. Niemeyer (Hatton Vale, Laidley), E. M. Schneider (Binjour Plateau), and L. R. Macgregor (Director or Marketing) have been appointed members of the Board from 11th March, 1929, to 10th March, 1930.

Pineapple Levy Regulations Extended.

By additional regulation under the Fruit Marketing Organisation Acts, the Pineapple Levy Regulations have been extended for a further period from the 25th January, 1929, to the 24th January, 1930. The levy in question is at the rate of $\frac{1}{2}$ d. per case of pineapples and, in instances where they are sold loose, at the rate of $\frac{1}{2}$ d. per forty-two rough-leaf or $\frac{1}{2}$ d. per twenty-four smooth-leaf pineapples. The levy is collected by means of stamps purchased from the office of the Committee of Direction and affixed to account sales.

Proposed Strawberry Board.

Notice has been given of the intention to create a Strawberry Board to deal with all strawberries produced in Queensland for sale for a period of one year, such Board to consist of three elected representatives of growers and the Director of Marketing. Nominations for growers' representatives will be received up to the 21st March, 1929, and each nomination must be signed by at least seven growers of strawberries. Persons deemed to be growers and eligible to vote are persons who, at any time during the period commencing on the 1st January, 1928, and ending on the day of the poll, have had growing for sale strawberries in any part of Queensland. On the constitution of the proposed Board, the whole of the strawberries shall forthwith be divested from the growers and become vested in and be the property of the Board.

Normal Temperature of Animals.

The temperature, as taken with a thermometer, is an index of the heat of the blood, and this, even in the healthy animal, varies within certain limits. The normal temperature is raised slightly after a meal, during rumination, lactation, and in pregnancy. Work also raises it, so that the normal temperature of the same animal may be slightly higher in the evening than in the morning. Young animals have a slightly higher normal temperature than old ones, and animals of ardent and sanguine temperament a higher one than sluggish and phlegmatic ones.

| | Degrees Fahr. | |
|------------------------|---------------|----------|
| Horse | 99.5 | to 101 |
| Ox | 100 | to 102.5 |
| Sheep | 101 | to 104 |
| Goat | 101 | to 104 |
| Pig (adult) | 101 | to 102 |
| Pig (young) | 102 | to 104 |
| Dog | 100 | to 102 |
| Rabbit | 100.85 | to 102 |
| Cat | .. | 100.4 |
| Fowl (average) | .. | 107 |
| Small bird | .. | 108.6 |

Lake Pleasant, a Sanctuary for Animals and Birds.

Lake Pleasant, via Goovigen, Dawson Valley line, and an area within ten chains of the borders of that lake, have been declared a sanctuary for animals and birds.

Sanctuary at North Pine.

The properties of Mr. A. J. Wyllie and the adjoining Reesrves (R. 125 and R. 120) at North Pine have been declared a sanctuary for animals and birds. In connection with this sanctuary, Messrs. A. J. Wyllie and T. P. Sweeney have been appointed Officers under and for the purposes of the Animals and Birds Acts.

Poison for the Destruction of Noxious Plants and Useless Timber.

The attention of landholders is directed to an advertisement of the Prickly-pear Land Commission appearing in this issue relative to the use of arsenic pentoxide for the destruction of noxious weeds and useless timber. This poison, as is well known, has been proved to be most effective in the destruction of prickly-pear, and the Government has now authorised the Commission to make it available for the destruction of other weeds on the same terms as for prickly-pear destruction. The prices charged are on a low scale, and, in addition, the Commission pays railage.

Orchard Cultivation—Economy of Zigzag Tillage.

Discussing in the current "Agricultural Gazette" (N.S.W.) the important subject of orchard cultivation, the Orchardist of Glen Innes Experiment Farm observes that the most efficient and economical method of cultivation adopted at the farm orchard has been what might be called the "zigzag diagonal" method.

By using such a method both ways and with careful driving, hoeing is practically eliminated. The zigzag cultivation may be carried out in the direction of the rows of trees and crosswise, but the angular turns are so sharp that they do not allow of freedom in driving. Trees planted 24 feet apart on the square give a distance of 34 feet on the diagonal, and if the cultivations are carried out in the direction of the diagonals, the greater distance between trees affords more freedom for driving the horses. By using the zigzag method—that is, by driving the horses from one side of the diagonal row to the opposite side immediately after they have passed the tree—the cultivator can be drawn as close to the tree as the driver desires and no ground need be left unstirred; indeed, care has to be taken not to allow the horses to cut in too quickly lest damage be done by the cultivator cutting the trees. When an extended springtooth cultivator is used there is little risk of damage if the necessary care be taken in driving.

On those sides of the trees on which the cultivator is travelling a small triangle of ground is not stirred, but if the succeeding cultivation is done diagonally crosswise to the preceding one every square inch of ground is cultivated.

Pigbreeding in Denmark.

One of the most practical and efficient systems of swine breeding in existence is the one in operation in Denmark for the last few decades. It was planned and organised by the late P. A. Morkeberg. All breeders co-operate under the leadership of the Department of Agriculture in maintaining certain high standards and in producing the finest type of market pig. The registered breeding stock of the country is maintained in State-supervised breeding centres. Any farmer who has shown his ability over a period of time to raise purebred pigs can, upon application, have his farm certified as a breeding centre. Every animal intended for breeding purposes in such a centre must be approved by a representative of the Department of Agriculture, and its progeny must be subjected to a production test in one of the three Government swine breeding experiment stations before such a breeding animal can be certified and registered.

Four pigs from each sow are sent to the breeding station, there constituting an experimental lot. The rapidity of growth and economy of gain is ascertained, and upon reaching a weight of 200 lb. the pigs are slaughtered and subjected to a detailed killing test. This standard of achievement is extremely practical, for it does not involve showyard winning or extreme production of any sort, but rather the ability to beget litters that will make a quality export bacon as cheaply as possible. If a sow fails to demonstrate sufficient fertility or produces pigs that do not measure up to the standard, she will not be admitted to the herd, and no offspring from her can be registered.

The Foundation of Farming—The Cow.

The cow really forms the foundation of the farming industry. Not only does she supply the world with all the milk products, such as butter, cheese, milk, and cream, but almost all her flesh can be eaten, and beef is the staple meat of most countries. Her hide is used for making leather, and her hair for mixing with plaster. Glue is made from her hoofs, and gelatine powder from her joints. When everything else is removed her bones are ground into fertiliser. No other animal serves mankind in so many ways.

Cause of Soft Pork.

The experimental farms have been hunting down the cause of soft pork, and come to these conclusions: Pigs fed a ration which is lacking in balance go to the shambles without the bloom which a well-conditioned young porker should show. These are the pigs which make up into soft pork. Certain feeds are more prone to cause this defect in meat than others, but it is believed that any feed given exclusively will bring about that lack of vigour and thrift which is invariably associated with soft pork. These same feeds properly compounded into a balanced ration will produce no bad effects on the finished product.

A Tank Stand.

A suitable stand for a tank can be made by filling a ring of corrugated iron with sand. The ring should, of course, be well riveted, and it is also advisable to further strengthen it by means of hoops of fencing wire twitched up hard against the iron.

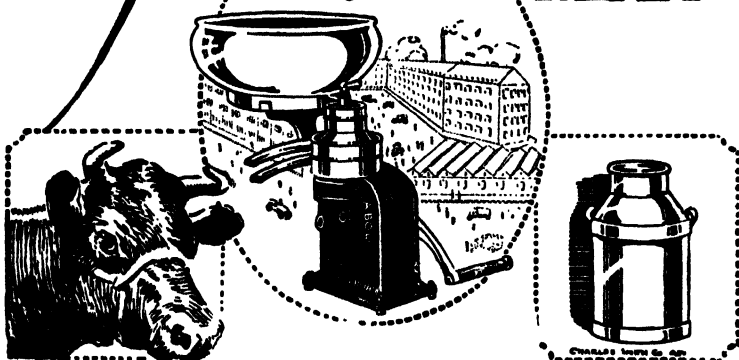
The greatest pressure on the floor of the tank will be about its centre, and it is advisable, therefore, to give the sand filling a slight crown at the centre so that the tank, when full, will settle with a level floor. The life of the floor of the tanks, and also of the ring of galvanised iron will be greatly extended if the surfaces coming in contact with the sand are given a wash of cement.—N. L. Jones, in the "Journal of Agriculture," N.S.W.

A Good "Handler."

Why are there so many hard feeders and bad thrivers amongst our commercial stock? Simply because no regard is paid in the breeding of many of our "stores" to those points that are productive of quick growth, early maturity, and capacity to fatten. Many of the bulls in use in dairy herds handle more like shoe leather than a kid glove, and it is their stock that feeders and graziers have to waste time and money on in fattening for the butcher. Another important point in the handling of a beast is to see that it has width of loin. A celebrated judge of cattle years ago, who officiated at many of the leading shows all over the country, was blind, and depended entirely on his hands in forming his judgment. He usually felt the loin and the skin and hair, and if they satisfied him it was enough. It is said that he seldom, if ever, was wrong in his judgment. That says much for the importance of "good handling" and a strong wide loin. There certainly has been some improvement in the last decade in the loins. There are fewer "slack" loins than formerly, and we see fewer animals "dipping" in the loins when standing, which was a very common fault a few years ago, particularly in the short-legged, big-bodied type of beast. Any animal to win in a showyard to-day must carry its back well and maintain the straightness of the top line when standing still. Slack loins are difficult to breed out, and it should always be made a strong point in a breeding animal that the loin is wide and strong, and the hand should be put over it to feel that it is so.—"The Live Stock Journal" (England).

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

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Mr. M. STUART.

Mr. MONTGOMERY STUART, Sydney's eminent Elocutionist and Adjudicator, writes:—"I have no hesitation in proclaiming HEENZO the finest remedy I have ever used for soothing sore throats, preserving the voice, and banishing coughs and colds."

HEENZO should be used in every home.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.

COMMON ERRORS IN THE MANAGEMENT OF THE BABY.

A mistake very frequently made, and which may lead on to very serious results, is that of giving the newborn infant artificial food in its first two days of life, before the mother gets her milk supply. We know that the mother's milk does not come in until the end of the second day, or the beginning of the third day after baby is born. Many mothers at this time get distressed at the thought that they have no food for baby, and in their anxiety they give him a bottle with artificial food of some kind. A food that is commonly selected is condensed milk, and it is usually given with the idea that it is merely a temporary measure to last only for the day or so, until the milk comes in. Every baby likes sweet things, so he takes the bottle willingly, and, in the time during which it is given to him regularly, he becomes very fond of it. Usually it is given from a feeding bottle with a large-holed teat, from which he gets the food, almost without the trouble of sucking for it. A little later the mother has plenty of milk and the baby is expected to take it. But mother's milk is only faintly sweet and baby does not like it nearly as much as he likes the very sweet condensed milk. Also, to get his mother's milk he would now have to suck vigorously, which he could not be expected to do to obtain food which he does not like. Naturally, he refuses to take the breast, and cries lustily for what he wants. The mother is distressed, as she realises that baby is refusing his food when he must be hungry. She strives, for half an hour or more, to make him feed, and at the end of that time both mother and child are tired out. The baby is screaming with hunger and disappointment and rage; and by this time quite possibly the mother is crying too. Then, in her distress she gives him another bottle of condensed milk, and so it goes on. When the next feed is due baby again fights and screams, and refuses the breast, and once more the sweet condensed milk is given. Because the mother is worried and anxious, and also because her milk is not being used, it first decreases in quantity, and later dries up altogether, so that baby is soon fully weaned. He must then be brought up on a bottle, with all its risks and disadvantages. This happens because the mother does not know that the very small quantity of food which she has for her baby during the first two or three days of his life is amply sufficient for his needs at that time.

Result of the First Mistake.

Put him regularly to the breast during the day; give him drinks of cool boiled water between his feeds and he will require nothing more. So managed, when the mother's milk comes in, he will go willingly to the breast, and subsequent natural feeding is carried on without difficulty. It is not only condensed milk which can cause this trouble, though on account of sweetness it is probably the worst; other foods, e.g., dried milk or cows' milk sweetened with ordinary sugar, can have the same result. Whatever food is given to the baby and readily taken by him in his first days he becomes accustomed to, and demands in the only method at his command, i.e., by crying lustily. This crying is very disturbing to a mother, particularly one with her first child. It is her anxiety for his good which had led her to make this mistake, which can have such serious results. Later she says, "I had to wean baby; he would not take the breast," not realising that by her own actions she has been responsible for his weaning. So give baby, in his first two or three days of life, and for nine months after, what nature intended him to have—his mother's milk.

"Dummy" Condemned.

This is a most common practice. Many babies are given the dummy soon after birth; sometimes even during the first day. With regard to the dummy, I think the mothers cannot all plead ignorance. I think a great number of them know that baby should not have it, but I am sure that they do not realise fully the ill results that may follow its use. If they did, they would not give it to him. No mother who loves her baby wishes to do him harm, yet by giving him a dummy she is exposing him to serious risks.

Now, let us consider the baby who has a dummy given to him on his first day. It is put into his mouth, and because he is born with the sucking instinct strongly developed he enjoys sucking it. He is not very hungry during his first day or two, but in that time he gets used to the dummy teat, and the feel of it in his mouth. When it falls out of his mouth he misses it, and cries for it to be replaced. Then the mother's milk comes in; also, at this time, baby gets hungry. He is put to the breast, but, being accustomed to the shape and size of the dummy, he resents the change. So he screams, and refuses to suck, and the worried mother, after endeavouring in vain to make him feed, gives him a feeding bottle with artificial food. This, as before explained, is the first step towards the weaning of the child.

A Grave Risk of Infection.

But the use of the dummy is still continued. Sometimes the baby cries. He may be wet, or too hot, or otherwise uncomfortable, which causes him to cry in spite of the dummy being put in his mouth. Then, not infrequently, it is dipped in honey or condensed milk, or glycerine and borax, or malt extract, or some other sweet stuff before being replaced in his mouth. Of course baby likes the sweet stuff, and for the time being stops crying. But very quickly he learns that he can get the pleasant substance by crying for it, and this he does, more and more often. Such things, repeatedly given, can lead to severe digestive upset. Glycerine and borax frequently given in this way can act as a poison to the baby. At night the baby who is accustomed to a dummy goes to bed with it in his mouth. As he falls asleep his lips relax and the dummy falls out. Even when almost asleep he misses it, rouses, and cries until it is again put in his mouth. So it prevents his sleeping as well as he would do without it. The dummy is a grave risk of infection for the infant. If it is not pinned on his frock it frequently drops on the floor, where it picks up dirt, and then, after being casually wiped—sometimes on the mother's handkerchief—it is replaced in baby's mouth. Frequently it is pinned to baby's frock, where it is still very dangerous. Every summer we have an epidemic among babies, sometimes called gastro-enteritis, sometimes called summer diarrhoea. It is really dysentery, and is caused by disease germs, which are carried by flies. When the dummy falls out of baby's mouth and hangs pinned to his frock, flies are attracted by the warm moist surface. They alight on it and infect it, perhaps with the germs of dysentery. This infected dummy is put in baby's mouth and he may become very ill. Many babies die of summer diarrhoea every year. Breast-fed babies, unless they have dummies, seldom get the disease. Another reason why a dummy should not be used is because constant sucking of it is tiring to baby's jaws. Then, when he is put to the breast, and should suck strongly, he is too tired to do so, and as a consequence, he may not get the quantity of food he needs. In addition, there is the effect on the child's character. The baby who, throughout infancy, has been trained, whenever not sleeping or feeding, to demand a dummy to suck constantly will develop later into the spoilt child who demands his own way in other directions, and cries until he gets it. So giving baby a dummy is frequently one of the first steps in the spoiling of the child.

Evil Results Summarised.

It may make him refuse to take his mother's milk; this frequently leads to weaning, and all the risk, work, and expense attendant on the artificial feeding of an infant. It is well to remember here that the death rate among artificially-fed infants is much higher than among those who are breast-fed. Putting sweet things on the dummy may result in severe digestive upset. Because he wakes up when the dummy falls out of his mouth, it can cause broken nights for both mother and child.

It will certainly expose baby to grave risk of infection from flies. Dummy-sucking tires baby's jaws, and as a result he may not take all the food he requires for his growth and health. Indulging baby with a dummy means helping to spoil him. Mothers say that they give baby the dummy to keep him from crying. If baby cries unduly do not put a dummy in his mouth, look for the cause of the crying and try to remove it. A baby who has never had a dummy never cries for one. If baby cries for a dummy it means that he has been trained to expect it.

KITCHEN GARDEN.

Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally, except cucumbers, marrows, and pumpkins. In connection with these crops, growers are recommended to adopt some form of seed selection for the purpose of improving the quality of vegetables grown by them. Just at present, selections should be made from all members of the cucurbitaceæ (pumpkins, cucumbers, &c.). Tomatoes should also be selected for seed. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

GROWING GOOD LETTUCE.

If you would have really good lettuce do not rely on one sowing only. It is better to sow a little seed every ten days or so than make one sowing only. Do not sow thickly. Try the plan of manuring a shallow trench, covering it with fine soil, and then dropping two or three seeds at given distances, say 4 inches apart. Little thinning will be required, and the plants will make uninterrupted growth. These will mature quicker once they get a start than transplanted plants.

RHEUMATISM.

What It Does.

Rheumatism in childhood causes heart disease in manhood.

Rheumatism in manhood causes—

Pains in the bones and aches in the joints;
Crippled limbs and shooting nerves;
Lumbago and sciatica.

Rheumatism is a strong man's burden. It is easy to find, but hard to lose.

Why It Comes.

Rheumatism rules where the body is unhealthy and is being poisoned.

The poison comes from germs living on—

Bad teeth;
Enlarged tonsils;
Unhealthy throats;
Discharging ears;
Festering sores.

From indigestion and constipation;

From cold, damp houses;

From damp, cold clothes;

From too heavy work and too little sleep;

From drinking too little water and too much alcohol.

What to Do to Avoid It.

Wear clothes, clean, dry, and airy.

Change clothes, wet with sweat, quickly after work.

Wear more clothes when facing cold air after being before hot furnaces.

Keep your feet dry.

Eat fresh food, well cooked.

Eat fresh fruit, vegetables, and eggs, and drink fresh milk.

Eat slowly and in comfort, not sitting on some cold stone.

Drink plenty of fluid; but avoid alcohol, or if taken, take at meals sparingly.

Take care of your teeth; toothache and rheumatism go together.

Look after your throats, especially the tonsils of children.

Have running ears properly treated.

A clear skin and a warm bath are great helps to a healthy body.

Avoid undue strain after forty years of age.

Take eight hours' rest every night.

Help your body to be healthy, and your body will help you to be happy.—

E. L. COLLIS, M.D., M.R.C.P.

THINNING GROWING CROPS.

The presence of superfluous plants in a row retards and weakens the growth of the entire row. Therefore, the advantages which follow early thinning should be sufficiently obvious to all. Crops such as beetroot, parsnip, and salsafy, the small roots have no culinary value, should have a first and final thinning as soon as the seedlings are through the soil, but when dealing with others, such as carrots, onions, turnips, &c., at all stages of their growth a different course should be followed. The first thinning of each of these should take place when the plants show the true leaf. At the same time give the rows a sprinkle of old soot or wood ashes to make the tops distasteful to birds. A fortnight later each alternative plant in the row may be drawn and, if during the interval, a few warm showers have fallen, many of the largest of the thinnings will have at least some value in the kitchen. Continue to draw away each alternative plant until those in the row in the long growing or intermediate section stand from 6 to 9 inches apart. Large turnips are rarely sought after by those who appreciate them during the summer: in fact anything above the size of an ordinary orange seldom finds favour. To secure these the first thinning out should take place soon after the seedlings appear. Allow 4 inches between the plants, which distance will provide space for all to develop into decent bulbs before they touch each other, when each alternative one may be pulled up. If not required at once these keep much better if again "laid in" where the soil is damp. The neglect of timely thinning out is more apparent with onions than with most vegetable crops. Instead of leaving the whole bed in an overcrowded state until the plants have reached a critical stage, why not thin all except the outside row when the plants are 3 to 4 inches high. After thinning the outside rows as suggested these onions may be drawn upon to continue the supply for salads when those in the beds have attained the size of walnuts. After thinning out either of the above-mentioned crops, it is very necessary that a little more than ordinary attention be paid to the beds, and should no rain promise, give the rows a watering through a fine-rosed can, which, in addition to settling the soil about the roots, keeps the plants in a fresh condition, and having received little or no check, they soon settle down to new growth. Twenty-four hours after watering give the soil between the rows a stir with the hoe, and just before the next storm use nitrate of soda, at the rate of one ounce to each square yard, keeping this from the foliage.

TO REPAIR A LARGE LEAKY GALVANISED IRON TANK.

Carefully clean out the inside of the tank by removing all grease, dirt, and corroded incrustations; but this must be done carefully or the holes will be enlarged.

Both inside and outside should be cemented, especially if the holes are numerous. It is not then necessary to stop the holes with any special stopping, as the cement compo when laid on will pass through the holes on to the outside and will form a much better key than if they had been stopped.

Commence with the inside, and after cleaning as above described, give the sheets a coating of cement-wash (pure cement and water), about the thickness of cream, starting at the top and working down about 8 feet at a time. Then, before this is quite dry, fill in all the corrugations with a compo consisting of one part cement to one-and-a-half parts of clean, sharp sand. Proceed in this way to the bottom, then, as soon as possible, begin again at the top and lay on a coat three-quarters of an inch thick of one cement and one and a-half sand, and finish off with a wood or steel float.

Cover the bottom of the tank with wire-netting about 1-inch mesh, and before finishing the sides turn up some strips of netting at intervals against the sides and cover them with cement. Then cover the whole of the bottom with three-quarters of an inch of compo as before, and work it well with a wood or steel float. Run a fillet about 1½ inch wide all round at the intersection of the side and bottom.

To make a thorough job of a tank of this size, the outside should then be treated in the same way, which will make the walls of the tank about 2½ inches thick and very durable. Thirty-two bags of cement and about three yards of sand will be required to do both sides and bottom. Nineteen bags of cement and two yards of sand for inside and bottom only.

To line a 1,000-gallon tank as above, one side only, two casks or six bags will be required with half a load of sand.

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MRS. R. LUXFORD—Crimson.
MRS. R. C. PULLING—Lemon Yellow.
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Orchard Notes for April.

THE COASTAL DISTRICTS.

In the Orchard Notes for March the attention of citrus growers was called to the necessity of their taking the greatest possible care in the gathering, handling, sweating, grading, and packing of the coming crop of fruit, as the returns for the labour expended in the upkeep of their orchards will depend entirely on the condition in which the fruit reaches the market. Many growers fail to realise the very important fact that the success of fruitgrowing does not depend merely on the proper working and management of the orchard, so essential for the production of a good crop of high-class fruit, but that the manner in which the fruit is handled and placed on the market is of even greater importance. In no branch of fruit culture is this more evident than in the case of citrus fruits, as no fruit pays better for the extra care and attention necessary to enable it to be marketed in the best possible condition. Every season there is more or less loss in the consignments sent to the Southern markets, the percentage depending mainly on the weather conditions, the loss in a wet year being much heavier than that in a dry year.

A very large percentage of the loss is due to what is known in the trade as specking—viz., a rotting of the fruit caused by a mould fungus, and this loss can be prevented, provided necessary precautions are taken. Although this matter was dealt with last month, it is of such vital importance to our citrus growers that it is necessary to again refer to it.

In the first place, growers must clearly understand that specking cannot occur on perfect fruit, the skin of which is free from injury of any kind. The fungus causing specking can only obtain an entry into the fruit through an injury to the skin; it will thus be seen that the remedy for specking is to take every possible care not to injure the skin of the fruit in any way.

Few growers realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions, when the skin is full of moisture and so tender that the least sign of rough handling causes serious injury, as the cells of the skin are so brittle that they are easily broken, and when so broken a ready means of entry for the mould fungus is provided, and specking follows in due course.

The remedy for specking is in the hands of the grower, who must learn so to gather, handle, and transport the fruit from the orchard to the packing-shed that it does not receive the slightest injury, and further, that when it has reached the packing-shed it must be carefully placed in shallow bins or on trays and be exposed to the air for at least seven days, so that the surplus moisture in the skin may be removed, and the skin thus becomes toughened and less easily injured. This drying of the skin is known as "sweating," and during the time the fruit is being sweated it should be kept under observation, and all fruit showing signs of specking or injury from fruit flies, sucking or boring insects, mechanical injury or bruising, should be removed.

In order to prevent injuring the skin when gathering, all fruit must be cut and not pulled. Gloves should be used to handle the fruit, and when cut it should be placed in padded baskets or other suitable receptacles. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. At the same time, if the injury is only slight, it can be sent to a local market for quick sale.

For Southern markets only perfect fruit should be selected, and further, it must be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case. The cost of cases, freight, and marketing is now so high that only the best fruit will pay to send to the Southern States, and even the best fruit must be properly graded and packed in order to produce the best returns.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention, as from now till the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, in the first place, to retain moisture in the soil, and, in the second, to enable birds, ants, and predaceous insects to get at and destroy the pupæ of fruit flies and other pests harbouring in the soil.

Banana and pineapple plantations must be put into good order, and kept free from weed growth.

Land to be planted with trees should be got ready, as, if possible, it is always advisable to allow newly cleared land time to sweeten before planting.

Strawberries can still be planted, and the earlier plantings must be kept well worked and free from all weeds in order to get a good crop of early fruit.

Scrub land intended for bananas can be felled now, as there will be little more growth, and it will have ample time to dry off properly in time for an early spring burn. Do not rush scrub felling, as it is work that pays for extra care. Lopping will improve prospects of a successful fire.

Keep a keen lookout for fruit flies, and on no account allow any fallen fruit of any kind to lie about on the ground unless you are looking for trouble with the ripening citrus fruit. Keep the fly in check, and there will not be any very serious losses; neglect it, and there will not be much fruit to market.

The advice given with respect to the handling and marketing of citrus fruit applies equally to custard apples, pineapples, bananas, and other fruits. In the case of bananas handled by the Committee of Direction of Fruit Marketing, grading is now compulsory, and it will undoubtedly tend to stabilise the market for this fruit.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Practically the whole of the fruit crop will have been gathered by the end of March, but several of the later-ripening varieties of apples grown in the Granite Belt may be kept for a considerable time, provided they are free from fly or other pests and are stored under proper conditions. Varieties such as Jonathan can be kept for some months at a temperature of 31 to 32 degrees, and later varieties, such as Granny Smith and Sturmer, can be kept till apples come again if stored at the same temperature. At the same time, although storing the fruit at this temperature under artificial conditions enables them to be kept for many months, the fruit can be kept for a considerable period, and marketed from time to time as desired, by storing it in a specially constructed apple-house in or adjacent to the orchard where grown.

Such a store can be cheaply constructed in the side of a hill out of the soil of the district and slabs of timber. The soil will make excellent pisé for walls, and the roof may be constructed of slabs covered with soil. Such a store can be kept at a very even temperature, and if the air is changed during cool nights—not frosty nights—the temperature can be reduced to a low point—low enough to keep the fruit in good condition for many weeks.

All orchards and vineyards not already cleaned up must be put in order, and all weeds destroyed. Keep the surface of the soil stirred so as to give birds and insects a chance to get at any fruit fly pupæ, as it is necessary to destroy this pest whenever there is a chance of doing so.

Land intended for planting during the coming season should be got ready in order to expose the soil to the cold of winter, thus rendering it sweeter and more friable.

If there is any slack time in the course of the month, go over all surface and cut-off drains and put them in good order. Also, if during periods of heavy rain, soft or boggy spots have made their appearance in the orchard, do what draining is necessary, as badly drained land is not profitable orchard land, and the sooner it is drained the better for the trees growing upon it. Soft or boggy spots are frequently caused by seepage of water from a higher level. In this case a cut-off drain will be all that is necessary, but where the bad drainage is due to hard pan or an impervious subsoil, then underground drains must be put in. After draining, the land should be limed. Liming can be done now and during the following three months, as autumn and winter are the best times to apply this material.

When the orchard soil is deficient in organic matter (humus) and nitrogen, try the effect of green-crop manuring, planting the grey or partridge pea and manuring the ground for this crop with a good dressing of finely ground island phosphate or basic phosphate.

Where citrus fruits are grown, they should now be ready for marketing. If the land needs it, it should be given an irrigation, but unless the trees are suffering from want of water it is better to stick to the use of the cultivator, as too much water injures the keeping and carrying qualities of the fruit.

The remarks on the handling and packing of citrus fruits in the coast districts apply to the inland districts also, but these districts have an advantage over the coast in that, owing to the drier atmosphere, the skin of the fruit is tougher and thinner, and in consequence the fruit carries better.

Farm Notes for April.

FIELD.—Those areas already lying in fallow for subsequent sowing with wheat should be kept in good tilth, using field implements that have a stirring effect in preference to those which tend to reverse the surface soil. The surface should never be allowed to cake; consequently all showers must be followed by cultivation, as soon as conditions will permit of teams and implements working freely.

Early fodder crops, such as barley (skinless or Cape) and certain varieties of wheat may be sown during April. Growers of winter fodders will be well advised to study the article dealing with dairy fodder plots which appeared in February, 1922, *Journal*.

Potatoes should now be showing good growth and must be kept free from all weed growths by means of the scuffer. If sufficiently advanced, and any doubt exists as to the prevalence of blight, advantage should be taken of fine weather to give a second spraying of "burgundy mixture," a calm and somewhat cloudy day being chosen if possible for the spraying.

Where land has been previously well prepared, lucerne sowing should be carried out this month, and intending growers of this fodder will be well advised to ascertain the germinating qualities of seed submitted to them for purchase. The difference between a good and bad "strike" is often traceable to the poor class of seed sown.

Maize and cotton crops should now be in the harvesting stage, and, once matured, are better in the barn than the open paddock, where weevils and other insects are usually prevalent at this season of the year.

Root crops sown last month should now be making fair growth, and during the early period of such should be kept free from weeds, and where necessary, thinned out. Sowings of mangels, swedes, field carrots, sugar-beet, and rape may still be made where conditions of moisture will permit.

As the sowing season is close at hand for certain varieties of wheat—i.e., those which require a fairly long period to develop in, every effort should be made to bring the seedbed into the best possible tilth and to free it from foreign growths of all kinds. The grading of all seed-wheat is strongly recommended, and growers who favour certain varieties should adopt a system of seed selection from prolific strains with a view to the raising of larger quantities of pure typical grain for ultimately sowing in their larger fields.

Pickling of wheat to prevent smut (bunt) is necessary. Germination tests should be carried out prior to commencing seeding operations.

Sorghums which have matured and are not immediately required as green fodder should, wherever possible, be conserved as ensilage to provide for a reserve, to tide over the period when grasses and herbage are dry. Succulent fodder of this description is the best possible form of insurance against drought, and for maintaining dairy and other stock in thrifty condition.

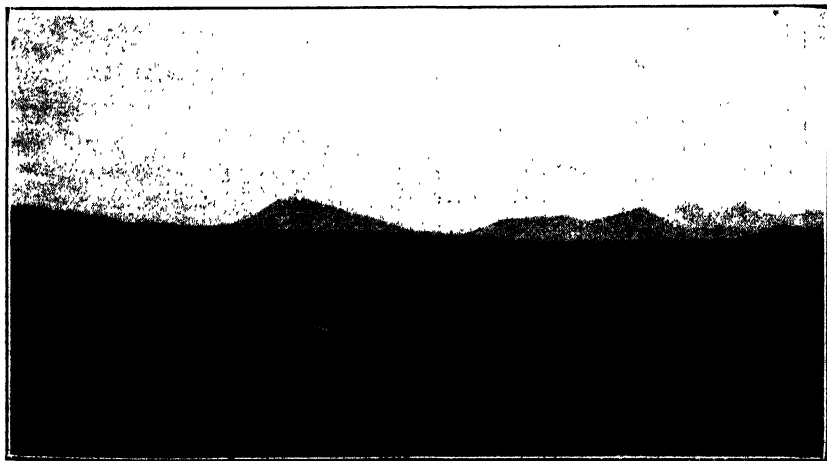


Photo.: Jean Easton.]

PLATE 84.

Looking down on the Coochin Country from Minto Crag.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.**AT WARWICK.****MOONRISE.**

| Date. | March, 1929. | | April, 1929. | | May, 1929. | |
|-------|--------------|-------|--------------|-------|------------|------------|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 5.46 | 6.24 | 6.4 | 5.48 | p.m. 9.45 | p.m. 10.25 |
| 2 | 5.47 | 6.23 | 6.5 | 5.47 | 10.20 | 11.16 |
| 3 | 5.48 | 6.22 | 6.5 | 5.46 | 11.0 | 0.0 |
| 4 | 5.48 | 6.21 | 6.6 | 5.45 | 11.46 | a.m. 12.11 |
| 5 | 5.49 | 6.20 | 6.7 | 5.43 | 0.0 | 1.6 |
| 6 | 5.49 | 6.19 | 6.7 | 5.42 | a.m. 12.34 | 2.5 |
| 7 | 5.50 | 6.17 | 6.8 | 5.41 | 1.28 | 3.5 |
| 8 | 5.50 | 6.16 | 6.8 | 5.39 | 2.22 | 4.4 |
| 9 | 5.51 | 6.15 | 6.9 | 5.38 | 3.29 | 5.5 |
| 10 | 5.51 | 6.14 | 6.9 | 5.37 | 4.20 | 6.6 |
| 11 | 5.52 | 6.13 | 6.10 | 5.36 | 5.20 | 7.10 |
| 12 | 5.52 | 6.12 | 6.10 | 5.35 | 6.20 | 8.16 |
| 13 | 5.53 | 6.11 | 6.11 | 5.34 | 7.19 | 9.25 |
| 14 | 5.54 | 6.10 | 6.11 | 5.33 | 8.20 | 10.34 |
| 15 | 5.55 | 6.9 | 6.12 | 5.32 | 9.23 | 11.40 |
| 16 | 5.55 | 6.7 | 6.12 | 5.30 | 10.29 | p.m. 12.40 |
| 17 | 5.56 | 6.6 | 6.13 | 5.29 | 11.39 | 1.35 |
| 18 | 5.57 | 6.5 | 6.13 | 5.28 | p.m. 12.42 | 2.22 |
| 19 | 5.57 | 6.4 | 6.14 | 5.27 | 1.44 | 3.2 |
| 20 | 5.58 | 6.3 | 6.14 | 5.26 | 2.44 | 3.38 |
| 21 | 5.58 | 6.2 | 6.15 | 5.25 | 3.38 | 4.9 |
| 22 | 5.59 | 6.0 | 6.15 | 5.24 | 4.25 | 4.39 |
| 23 | 5.59 | 5.59 | 6.16 | 5.23 | 5.4 | 5.11 |
| 24 | 6.0 | 5.58 | 6.16 | 5.22 | 5.36 | 5.40 |
| 25 | 6.0 | 5.57 | 6.17 | 5.21 | 6.13 | 6.16 |
| 26 | 6.1 | 5.56 | 6.17 | 5.20 | 6.39 | 6.53 |
| 27 | 6.1 | 5.55 | 6.18 | 5.19 | 7.10 | 7.35 |
| 28 | 6.2 | 5.53 | 6.18 | 5.18 | 7.42 | 8.23 |
| 29 | 6.2 | 5.52 | 6.19 | 5.18 | 8.16 | 9.12 |
| 30 | 6.3 | 5.51 | 6.19 | 5.17 | 8.54 | 10.5 |
| 31 | 6.3 | 5.50 | | | 9.38 | |

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | |
|--------|-----------------|-----------|
| 3 Mar. | ☾ Last Quarter | 9 9 p.m. |
| 11 " | ● New Moon | 6 30 p.m. |
| 18 " | ☾ First Quarter | 5 41 p.m. |
| 25 " | ☾ Full Moon | 5 46 p.m. |

Apogee, 4th March, at 2.54 p.m.

Perigee, 18th March, at 12.24 a.m.

The planet Uranus will be passed about 9 p.m. on the 12th at a distance of about 5 diameters of the Moon.

As soon as twilight fades on the 14th Venus and the crescent Moon (at a distance of 8 degrees to the left), will afford an interesting spectacle as they draw near to the western horizon.

The Moon will pass Jupiter on the 15th at 8 a.m. and it will be noticeable in the early evening before they set that the Moon will be above the planet to the eastward.

Mars will be passed on the 19th about 3 a.m. when below the horizon.

On the 21st the Sun will reach the celestial equator on its way northward and may be said to rise and set exactly due east and due west, affording an excellent opportunity to mark these points.

On the 23rd the Moon will be passing Neptune about 1 o'clock in the morning. Neptune is still apparently near Regulus one degree eastward, but requires a telescope and is of little interest for general observation. The other planet of small general interest, on account of its distance, Uranus, will be so much in a line with the Sun as to be entirely unobservable, especially on the 28th.

Venus will apparently reach its most eastern position amongst the stars of Aries on the 29th, after which it will seem to move backwards into the constellation Pisces until the 14th of May.

The Southern Cross will be coming into view, about 80 degrees east of south, at an early hour in the evening during this month; its position being nearly horizontal.

| | | |
|--------|-----------------|-----------|
| 2 Apr. | ☾ Last Quarter | 5 29 p.m. |
| 10 " | ● New Moon | 6 32 a.m. |
| 17 " | ☾ First Quarter | 12 9 a.m. |
| 24 " | ☾ Full Moon | 7 37 a.m. |

Apogee, 1st April, at 11 12 a.m.

Perigee, 18th April, at 7 30 a.m.

Apogee, 29th April, at 5 0 a.m.

Conjunctions with the Moon of Mercury on the 9th, Venus on the 10th, and Jupiter on the 11th, will be invisible on account of their apparent proximity to the Sun.

On the 12th Neptune will be only 9 minutes of arc to the north of Regulus, the brightest star in Leo and uppermost in the handle of the Sickle. It will, therefore, be an interesting object for owners of small telescopes all through this month.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 20 minutes; at Thargomindah, 28 minutes; and at Ootello, 48 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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PART 4.

Event and Comment.

Conference of Canegrowers—Minister's Opening Address.

THE Queensland Canegrowers' Association held its Third Annual Conference in March, commencing its sittings in Brisbane on the 19th. The Chairman, Mr. George Johnson, presided over a large and representative gathering of producers from all sugar districts of the State. It was fitting, he said, that Mr. Forgan Smith, the Minister for Agriculture, who was responsible for the Act under which their organisation was created, should declare the conference open. In the course of his inaugural address Mr. Forgan Smith said:—No doubt during the proceedings of this conference you will review the history of the past four years, take stock of your achievements, and review your future plans. However, I am satisfied that the canegrowers' section of the Queensland Producers' Association has justified its existence, and has long years of usefulness awaiting it in the years to come. The sugar industry plays a prominent part in the life of Queensland as a State. It is a most important agricultural industry, it affords a great amount of employment to a large body of our people, and in addition to that it is one of the main industries on which our White Australia policy is based. There are still in our midst unfortunately, in some parts of the Commonwealth, people who, while giving lip service to the White Australia ideal, would like to see some of our industries carried on under standards not compatible with white men's standards in any free community. I mention that to indicate that by the White Australia ideal we not only lay down as a Commonwealth policy something to ensure the purity of our race, but also to provide that the economic conditions for those engaged in those industries should be made such that the standards of comfort which white men and women have a right to expect should be maintained. I am called

upon to make these remarks on account of the agitation which arises from time to time regarding sugar prices and so forth, and also the intimation in the press within the last few days that certain interests are moving in the direction of having bananas produced by coloured people of other countries introduced into Australia. As the case for the home production of bananas is strong, so the case for the production of sugar is equally strong.

Review of the Sugar Industry.

IT is interesting to review the figures relating to the industry and realise what is involved from the point of view of Queensland in regard to sugar. The total assets are: Mills and refineries, £7,800,000; farms, £16,600,000; a total of £24,000,000 invested in the sugar industry in Queensland. The area under cane comprises approximately 300,000 acres, and the number of registered farmers engaged in the industry is 7,300. It gives employment to 28,000, and its wages bill alone is worth £6,000,000 a year. In addition to that, having regard to the interdependency of all industries, it can be calculated that the sugar industry gives employment for a very large section of the public in addition to those whom I have mentioned. It is estimated that directly and indirectly in Queensland the industry benefits 100,000 persons. The area under cultivation has increased in thirteen years from 161,195 acres to 274,838 acres. In the course of the same period the production of sugar has increased from 225,847 to 485,745 tons, and last year the total production was 515,130 tons, indicating a remarkable extension and showing to some extent the productivity of this State and the capacity for further expansion of the industry if suitable markets were available. On the question of production, I might state, as Minister for Agriculture, that the problem of surplus production is one that gives great concern each year. Your organisation and other organisations have dealt with this problem at various annual conferences, and various schemes have been put forward individually and by certain sections of the industry. Up to the present it has not been possible to secure anything like complete unanimity on any proposal, nor has any scheme been put forward that does not carry with it, as its inevitable accompaniment, certain serious economic dangers. In other words, one must review the industry from the point of view of the whole of the State and the Commonwealth, and where possible devise a scheme that will give justice to the grower, and at the same time do nothing that will affect the economic balance of the industry as it affects the national well being. As far as I am concerned, and the Government is concerned—it is not my purpose to refer to any of the proposals that you have on your agenda paper dealing with this problem—but I am authorised to say that any definite, concrete scheme that may be submitted and adopted at this conference, having for its object the control of the industry in an orderly manner and beneficial to the State as a whole and to the growers, will receive the very careful attention of the authorities in the State. In common with the other authorities, the Queensland Government has been making representations for improvement in the duty overseas with a view to helping you in the direction of a better price for your surplus product. So far as we have got to at present the preference duty given to sugar is insufficient to meet your requirements. Naturally, one cannot view with equanimity the continually growing surplus. It is a question surrounded with great difficulties. Various schemes have been tried in other countries, and some have been abandoned because they have broken down under the economic circumstances of production. However, if your conference, as representing the industry, can put forward a scheme relating to this matter which will achieve this purpose then we will be in duty bound to give every consideration to it.

A Charter of Control.

A GAIN, on the control side of the industry you have certain very important legislation. You have the Act of Parliament under which your organisation functions. In some quarters I notice that is being assailed. Certain people have put forward the idea that the Q.P.A. as an organisation statutorily established could be reviewed from a certain standpoint. I do not wish to go into any detail about the arguments that might be put forward for and against this form of organisation, but I do wish to impress this point on growers and others concerned that there must be some sound advantage to accrue to an industry that is given certain statutory authority that enables them to control their own industry. That is the point I wish to make. You are under your own Act, you are given a charter to control

your own industry to an extent that does not exist in any other State in the Commonwealth, and if that control is used with wisdom it must give the farmers definite benefits. Obviously no Government can do for an industry, or for an individual, what they should do for themselves. We can simply supply you with the machinery and the authority to do things. How you do those things depends on your own intelligence, on your own capacity, and the influence you exert on your fellow members. I would be very chary, if a member of this organisation, about supporting any activity that would reduce the authority and the powers you are able to operate under your own charter and your own statute.

The Benefit of the Cane Prices Act.

ANOTHER measure which affects your interests is the Cane Prices Act, an Act which, it is estimated, has benefited the grower considerably. Payment for cane by analysis has undoubtedly been responsible for much increased efficiency on the producing side. Under the system of computation now established, as against former methods, canegrowers benefited during the 1927 season alone to the extent of £630,000. It would be interesting to work out the figures obtained by the new method and the method adopted prior to this Act and see how much the grower has benefited directly and indirectly as a result of this legislation.

The Science Side of the Sugar Industry.

THE Sugar Experiment Stations Act is another measure with an important bearing on the efficiency of the industry. The amount of cane required to a ton of sugar is being gradually reduced. Sometimes it is claimed that it is entirely due to improved milling facilities, but I think the improvement in the efficiency extends all round. It is due to improved methods of cultivation, improved varieties of cane, and the improved standard of work in the sugar-mills. All sections have participated in the work of building up this industry to the standard it has attained. Last week, in Mackay, there was a conference of sugar technologists called by my department. Certain mills did not send delegates because, perhaps, of a suspicion that there was some nigger in the wood pile, some purpose in the mind of the Minister for Agriculture that has not been revealed. I want to say no such purpose was in my mind. Certain people may endow me with Machiavelian proclivities with regard to certain lines of policy, but my desire was to call together the trained men of the industry who would be capable of discussing technical matters affecting the mills of Queensland with a view to arriving at something to assist one another in coping with collective difficulties. All highly organised industries at the present time realise the importance of the scientific and technological side of their activities and the sugar industry would be well advised to build up a technological staff on the highest scale possible. Every aid that science and modern invention and improved methods can bring to any industry should be welcome and readily adopted. I am pleased to say that that conference was a distinct success, and a Queensland branch of the International Bureau of Sugar Technologists was subsequently launched in Mackay, and I am satisfied that in the future it will render very valuable service to the sugar industry. I hope when the next conference comes round that every mill in Queensland will be represented by one or more experts, who will persist in the work of elucidating the problems which affect the industry. It is also intended to build up the Bureau of Sugar Experimental Stations with a view to giving greater aid to the industry than has been possible in the past. Tangible evidence of its value is apparent, and it is pleasing to note the confidence that Mr. Easterby and others associated with him have been able to build up in all sections of the industry. As new problems develop you may rest assured that the bureau will be eager and willing to help in the solution of the many difficulties. That is as it should be. One of the most important functions, I consider, of the Department of Agriculture is to co-operate with the various activities in the agricultural life of the State, and help in co-ordinating the work of the various scientific organisations throughout the Commonwealth and thus throughout the world.

I wish you success in your conference, and in your industry, and if, as a result of your deliberations, some improvement can be effected to the industry in Queensland you will have achieved a very important national purpose. When you conclude your deliberations if you desire to put anything before the Government, by way of deputation, I will be pleased to arrange a meeting place where those resolutions can be discussed.

Bureau of Sugar Experiment Stations.

THE VALUE OF FERTILISERS FOR SUGAR-CANE.

REVIEW OF THE RESULTS OF SOME EXPERIMENTS AT SOUTH JOHNSTONE IN 1928.

The value of fertilisers as an aid in the reduction of production costs has always been emphasised by the Bureau. At the same time it has been pointed out that it is necessary to determine, by careful field experimentation, the exact manurial requirements of the crop, in order that the money laid out in purchase of fertiliser may be spent to the best advantage.

It is with this in mind that the farm experimental trials have been initiated this year. We hope that these tests will supply much of the information needed to enable us to make a definite recommendation as regards the fertiliser requirements of our various soil types existing under widely different climatic conditions.

Hence it must be stressed that results obtained on our Experiment Station at South Johnstone will not be applicable on all sugar lands in Queensland. Indeed, the conclusions which might be drawn, from trials made there, may have only limited application on other soil types in the Innisfail or far northern areas.

However, it will be explained how the fertiliser requirements of certain soils under a definite set of climatic conditions may differ from one another in degree only; the need for one or more plant foods may be uniformly felt, due to the dominating influence of climate. This state of affairs undoubtedly holds in the wet tropical belt north and south of Innisfail. For this reason some of the results obtained on the South Johnstone station during the past year will be emphasised.

The soils in this coastal area north of Townsville are favoured, in general, by an abundant rainfall. The excessive water which the land receives in the wet season is not held by the soil. Part is removed as surface drainage, while the remainder is drained away by percolation into the subsoil. The continued leaching to which the soil is thus subjected brings about the removal of large amounts of lime, potash, and other important plant foods, and very often results in the production of an acid soil.

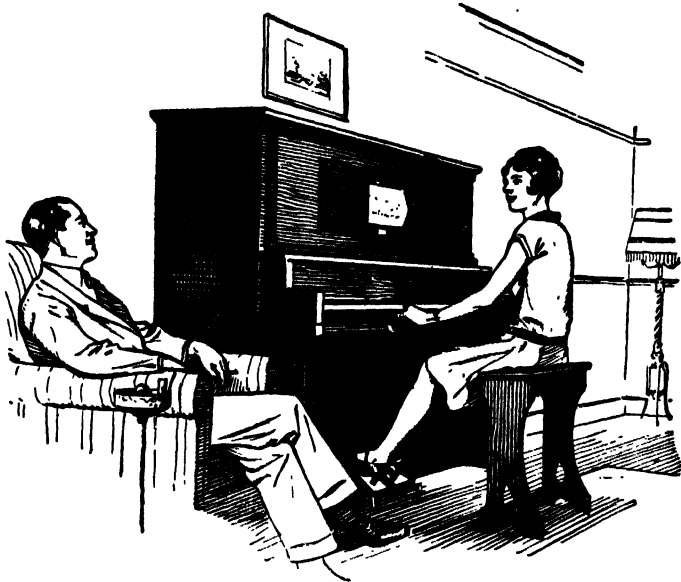
Many of our northern lands are found to exist in this acid condition, even in their virgin state. That they are able to produce very good early crops is due to the available plant foods which are set free when the soil humus is decomposed. This process is stimulated by the clearing of the land, and particularly by any cultivation operations which are performed. The low supply of easily decomposed humus, which is characteristic of these soils originally, means that after a few crops have been removed the soils are very considerably reduced in their productive power. If heavy crops are to be obtained once more, it is essential that certain deficiencies must be made up, so that the cane plant may have the desirable medium in which to carry on its life processes most efficiently.

The first essential is that the lime deficiency be corrected in order to destroy the acid state of the soil. With a lack of available lime, and consequently a sour condition in the soil, the plant functions under a great handicap. Very often the addition of lime alone to the soil so improves growing conditions generally that the crop response is very marked. This is well illustrated by results obtained on the South Johnstone station this past year. The soils on the station, in common with so many more in the Innisfail area, are very decidedly sour, and it was expected that the response to lime would be very appreciable. The results obtained were as follows:—

LIMING EXPERIMENT (PLANT CANE).

| | Tons cane per acre. |
|--|---------------------|
| No treatment plots | 32.9 |
| One ton burnt lime per acre harrowed in before planting .. | 39.1 |
| Gain due to liming | 6.2 |

We find, then, that a gain of 6 tons of cane per acre resulted from the treatment. There can be no question that the added return from the plant crop alone shows a



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very handsome profit. Reckoned at 25s. per ton net for the extra 6 tons, the return was £7 10s. To purchase and apply 1 ton of lime should cost less than £4. The beneficial results will, moreover, be lasting in their effect, and increased returns will certainly follow right through the succeeding ratoon crops.

The extent of the improvement in yield due to a lime application on this soil would have been shown still more definitely, had fertilisers been employed uniformly over the entire field, on both limed and unlimed plots, for a goodly supply of lime is necessary at all times if the maximum returns are to be obtained from manuring.

The second important experiment was that of the application of a heavy dressing of superphosphate. It is well recognised by agricultural scientists that an acid soil is usually deficient in phosphates. The acid condition of the soil favours the leaching away of this important plant food, so that the soil tends to become depleted. The dressings in this experiment were applied at the rate of 1,000 lb. of superphosphate per acre. Now there are few farmers in Queensland who would think of applying 1,000 lb. of mixed fertiliser per acre, far less this amount of superphosphate alone. Let us study the increased yields due to the treatment, and their value to the grower:—

SUPERPHOSPHATE EXPERIMENT (1ST RATOONS).

| | Tons cane per acre. |
|--|---------------------|
| No treatment plots | 24.1 |
| One thousand pounds superphosphate per acre, at ratooning .. | 33.8 |
| Gain due to manure | 9.7 |

The gain due to the use of superphosphate was 9.7 tons of cane per acre; allowing a net value of 25s. per ton—a decidedly low value—the added return was $9.7 \times 25s.$, or £12 2s. 6d. per acre. One thousand pounds of superphosphate would cost about £5 in Innisfail, and allowing as much as £1 for applying it, the net profit is still in excess of £6 per acre. Certainly an extra return of £6 per acre on a 50-acre harvest would appeal to most of our Queensland canegrowers. And, further, the benefits do not stop here. It has been shown by chemical analysis that a 40-ton crop of cane would take up about 70 lb. of phosphoric acid from the soil. Of this amount, 50 lb. are permanently removed in the cane which is sent to the mill, while the remaining 20 lb. are returned to the soil when the tops and trash are burned.

Now the 1,000 lb. of superphosphate contained 200 lb. of phosphoric acid, and only 50 lb. of this were removed in the crop. Hence, besides returning a very decided profit, the added effect of a permanent addition to the plant food supply of the soil was brought about—a process which alone makes for permanent agriculture.

These are but two examples of what might be done by treating soils with individual plant foods of the necessary type. It is not possible to calculate what would have been the result had the application of both lime and superphosphate been made on the one plot of land. Certainly the crop would have been considerably in excess of even the 39-ton crop obtained from lime alone.

The results bear out the prediction which has been stated repeatedly by the writer—that the amounts of fertiliser which might profitably be employed on both plant and ratoon crops, in many of our northern areas, is in excess of half a ton per acre per year. But let it be emphasised once more that the only sure way in which the true manurial requirements of any soil type may be fully known is to carry out a small, well-planned field trial on the particular type of soil on which the results are to be employed.

In conclusion, it might be not altogether unnecessary to attempt to dispel an erroneous idea which seems to linger in the minds of many growers regarding the results obtained from experiments on our stations. The defence often set up, to justify their not following the results we have shown, is that the care which our lands receive could not possibly be given under average farm conditions; and the extra cultivation is in a large measure responsible for the good results. The fallacy of this argument is very apparent; for in all experiments, such as those described, the difference in yields is due to the fertiliser treatment exclusively, as the same careful cultivation is received alike by both treated and untreated plots.

It is true, however, that clean fields are necessary in order that maximum returns may be obtained from the use of fertilisers; for weeds are only too ready to use the manure intended for the cane, and it is not profitable to fertilise both crops.

THE POSITION OF THE SUGAR INDUSTRY.

By H. W. KERR, M.Sc., Ph.D., Acting Director, Bureau of Sugar Experiment Stations.*

We are all well aware of the difficulties which are confronting the sugar industry the world over, and we in Queensland have not escaped the touch of deflated sugar values, which are causing the greatest uneasiness amongst all the sugar-growing countries of the world. There is probably no country to-day except Java which can produce sugar profitably at the present market price, and many and varied efforts are being put forth in an attempt to curb the increasing production which proceeds at a rate faster than that of increased consumption.

The present indications are that no hope can be entertained for improved sugar prices in the near future, as a large surplus continues to flood the world's markets.

Several schemes have been put forward from time to time, but growers have not yet succeeded in becoming unanimous on a method by which curtailment of plantings could be achieved successfully and justly.

Another alternative has been to attempt to obtain increased preference on sugar imported into Britain from Australia, and we hear much agitation for greater trade reciprocity within the Empire. But setting aside for the time being those matters which involve the invocation of outside aid, growers might seriously consider the question, "Have we done all in our power, by the adoption of the best methods of cultivation, by the use of adequate fertilisers applied in the right way and at the right time, and by growing those varieties which are best suited to our lands—have we done all we can to reduce production costs to a minimum?" In a country such as Queensland, where the standard of living is high, we must maintain a proportionately high degree of efficiency in order that we may continue to enjoy these privileges.

The Efficiency of the Queensland Sugar Industry.

We have heard considerable controversy in the past few months regarding certain statements contained in the annual report of the Director of the Bureau of Sugar Experiment Stations. It is true that some of the facts which it disclosed do not reflect the utmost credit on the efficiency of our methods. But I would take this opportunity of saying, in answer to outside criticisms, that our Queensland sugar industry is no less efficient than many other industries, both primary and secondary, which also enjoy privileges comparable with those bestowed upon the canegrower.

At the same time we must not lose sight of the fact that it is incumbent on us to continue our forward march, and demonstrate that a protective tariff does aid in development and the search after efficiency, and is not an obstacle in the path of progress.

Efficiency must be measured in terms of a comparison between our present results and the results which we might achieve, with the facilities we possess, and under the difficulties which confront us. It was never suggested that Queensland growers could achieve anything like what has been accomplished in Java, for instance, but I feel sure that there is, in certain of our areas at least, quite considerable scope for improvement.

Intensive Cultivation.

The principle of intensive cultivation in our sugar industry is so ardently advocated by us, because it means the maximum net return for labour and money expended in producing the crop, and I feel sure that you have in this Bureau an organisation which can afford you considerable assistance in achieving this end. The activities of the Bureau have been handicapped in the past, due to its having to function with a staff scarcely adequate for the work in hand. The return of the three Government research scholars from abroad has added very considerably to the strength of the personnel, and, if I may say, as one of them, the opportunities which they have had in their travels have afforded them a very intimate acquaintanceship with the experiences of the leading canegrowing countries of the world, the problems which have confronted them, and the manner in which they have been solved.

Reduction of Production Costs.

The ultimate aim and object of the Bureau must necessarily be to aid growers in reducing production costs. And, so far as agricultural methods are concerned, it has been proven in Java, Hawaii, and elsewhere that the most successful method of

* In an address delivered at a Conference of the Queensland Canegrowers, Brisbane, 21st March, 1929.

solving the difficulties is by means of field experimentation on a wide scale. We feel that this phase of the work is of such importance that it will constitute the major project of our agricultural division for many years to come. With this object in view a scheme has already been launched in Queensland, and I am pleased to say our early experiences have convinced us of the practicability of the method.

The First Objective.

Our first objective is a determination of the fertiliser requirements of our various soil types. We know that much can be achieved by the judicious use of the correct fertilisers, but we do not at present possess the desired knowledge which would enable us to declare just what are the fertilisers which will yield the maximum returns under our varied conditions of soil and climate. Hence we have planned for the setting out of about sixty fertiliser trials, to be distributed throughout all our mill districts, as an initial effort. Preparations for this work are well in hand, and we have already set out four of these trials in the Bundaberg and Childers districts. Our plan is to select a field which is about to be planted, and which carries a soil type of major importance in that particular area. The grower whose land has been chosen is one who is keen and appreciative of the value of this type of work, and who will give the trial the care which its importance demands. Further, we have attempted to select men who command the confidence of their neighbours whose lands possess soil of a similar type. The planning of a trial which should yield the maximum of useful data is made by ourselves, and we also carry out the work of laying out the plots, applying the fertiliser, and making observations on growth and growing conditions. Later, the supervision of harvesting operations will also be carried out by our officers, and the co-operation of the various mills has been assured with regard to the weighing and analysing of the produce from the individual plots. It has been our plan to ask the grower to provide the fertiliser necessary for the trial, and the ready response to this requirement has convinced us of the interest which growers are prepared to take in this experimental work. This is very gratifying to us, and should go far towards ensuring the success of the project.

However, I am very pleased to announce at this time that the fertiliser companies are also very appreciative of the value of our efforts, and altogether about £300 worth of the required materials have been placed at our disposal, which will provide for all our trials for this year. This fertiliser will be passed on to the growers who are co-operating with us, as a contribution from the fertiliser suppliers, in return for any added labour which the experimental trial may impose upon them.

Farm Experiments.

Naturally, the extent of the work which can be successfully initiated in one year is limited, and it is appreciated that many growers who would willingly take up the work with us must be disappointed for the time being. However, as the number of trials will be added to from year to year, it is hoped that before long all interested will have an opportunity of securing a trial on their farms. In about three years' time we expect to have about 200 farm experiments under way, and the value of the results secured on such a wide scale will be very evident.

The Future Work of the Bureau.

Our future work will not be confined to fertility trials alone, but we will extend the scheme so as to embrace all phases of experimental work—variety trials, cultivation tests, &c., which will aid growers in their pursuit after increased efficiency.

I hope it will be fully appreciated that the Bureau is making a determined effort to assist growers with their difficulties, but we can of ourselves do nothing without the full co-operation of the growers. I give you a full assurance of our readiness to serve; will you in turn pledge your support of this very important field of investigation.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

CANE PEST COMBAT AND CONTROL.

Mr. E. Jarvis, Entomologist to the Bureau of Sugar Experiment Stations, has submitted the following report for the period February to March, to the Acting Director of the Bureau:—

Insects Having a Good Time.

During this period of the year, when wet conditions combined with high temperatures are being experienced in the district of Cairns, insect life of all sorts is unusually abundant.

In addition to the large variety of insects damaging sugar cane, bananas, fruit trees, and many kinds of vegetables, the residents of this portion of Queensland are also exposed to personal attack from the various blood-sucking and other objectionable species commonly occurring in the tropics.

Although the chief object, of course, of the Sugar Bureau in issuing reports of this nature is to forewarn growers of the probable appearance of those insects thought likely (by the Entomologist) to cause trouble each month, it is also proposed to deal very briefly from time to time with the control of the principal noxious species which indirectly affect the health and activities of our cane farmers.

Just at present, grubs of the "greyback" cockchafer are enjoying the congenial climatic conditions brought about by alternate heat and generous showers; which bid fair, if continued during April, to ultimately favour their transformation into the pupal or chrysalis state.

Convincing evidence of the work of this formidable cane-beetle will gradually become apparent through April and May on many areas which during the last two or three years have either been slightly infested by or practically free from grubs.

Cane Pests Causing Trouble During the of Month of April.

1. Grubs of "greyback" cockchafers (eating the roots).
2. "Beetle borer" (tunnelling in the sticks).

All grubs of the "greyback" will now be in their third or last stage of growth, and feeding vigorously on the main roots or basal portion of the cane sticks.

To make sure that this final development has been reached, the grower has only to measure the width across the hard brown head of one of these grubs, which will be found to be exactly $\frac{3}{4}$ of an inch. In fields where they happen to be very numerous one cannot go wrong in collecting them during ploughing operations; since the value of this commonsense control method is recognised and practised whenever possible by farmers in other countries.

What About the Weevil Borer?

This beetle, although of secondary importance as a cane pest, must not have its activities overlooked. Its mere presence here and there in the butts of canes need not, however, cause alarm, unless such crops be destined to stand over to the next season before being cut.

Much good can be achieved by the owner himself, if he would take the trouble to find out the degree of an infestation by laying down bait-traps in the manner described in my hints for last month (March). In cases where few beetles are found in the traps, and the cane is about fully grown, it only remains for the grower when harvesting same to insist on low cutting; and the subsequent milling operations will do the rest by crushing all the living beetles with their grubs and pupæ contained in the canes.

Farmers' Interest in Pest Control.

It is often wondered when the interest of the farmer will be fully awakened in our insect pests of cane and their control, and he will ask himself the question-- "Why should these grubs or caterpillars be allowed to work their destructiveness unmolested by me, and spoil the ultimate result of the trouble and expense I have gone to, in thorough preparation of the ground, manuring, and clean cultivation of same?"

Why, indeed, when the grower holds the solution of the difficulty in his own hand, and can, if he chooses, prevent such depredations. Any farmer wishing to know how to successfully fight his insect enemies of cane should apply at once to the Entomologist at Meringa Experiment Station for assistance.

CANE PESTS AND DISEASES.

Mr. A. N. Burns, Assistant Entomologist, stationed at Mackay, has submitted the following report for the month ended 12th March, 1929, to the Bureau of Sugar Experiment Stations:—

Greyback Grubs now in the Third Stage.

Field observations made during the last day or two show that most of the grubs of this destructive insect have entered the third and final grub stage. It is from the present time, and until about the end of next June, that the most serious injury of cane roots will take place. Actual leaf indications, such as yellowing or wilting, may not show for some weeks yet, although the grubs are active all the time.

These are the resultant grubs from the eggs that were laid by the beetles during last December, the intermediate time having been occupied in the egg, and first and second grub stages. During these two stages very little actual injury is done to cane roots, the grubs subsisting principally on humus obtained from the continual ingestion of soil. Laboratory experiments have shown that this season practically all the beetles had ceased laying eggs by the first week of January. From fourteen to seventeen days are normally occupied during the incubation of the eggs, so that by the main bulk being deposited between the 14th and 25th December, many young first-stage grubs were in evidence about the first week in January. Periods varying in duration from four to five weeks were required by these grubs before changing into the second stage, which this season was reached in the majority of individuals by the first week of February. A slightly longer time elapses before the next moult into the third stage takes place, thus making the time spent in the second stage between five and six weeks.

It is an interesting fact that during the whole of any particular grub stage, the size of the grub's head does not alter, although the body increases considerably in size. Whilst in the first two stages the grubs are usually to be found about a couple of inches below the surface of the soil, unless the weather is unusually dry. As before stated, until they arrive at the third stage, their food consists mostly of humus obtained from the soil; certainly in the first stage this is so, and may be supplemented in the second stage with fine grass roots or the smaller and more tender cane roots.

As is unfortunately too well known, during the third stage the tables are turned, the grubs' diet consisting almost wholly of roots, &c. It is at the present time, before grub damage is apparent through the wilting of the cane, that growers should attempt fumigation.

Fumigation of Cane with Carbon Bisulphide.

For obtaining the best results possible from the use of this fumigant, two main things are necessary:—(1) Suitable weather conditions; (2) intelligent application of the bisulphide. This fumigant is extremely volatile, and the fumes being heavier than air, have a tendency to penetrate downwards into the soil. It is therefore essential that during the time of fumigating the soil be fairly free so as to allow the maximum penetration of the poison fumes. It can, therefore, be clearly seen that it would be utterly useless to attempt fumigation immediately following heavy or soaking rains. Several days should be allowed to elapse until such time as the ground is less consolidated and water-logged.

When handling bisulphide, great care should be exercised that it does not come into contact with fire, as it is not only highly inflammable but also explosive.

As already pointed out, the fumes of this material have a tendency to work downwards, therefore it is in this connection that the intelligent application of the bisulphide exists. Before treating a block of cane, a good general "depth survey" should be carried out. This means digging at a few stools throughout the affected area in order to ascertain the depth at which the grubs are situated. This discovered, the doses of poison should be applied to a depth slightly less than that at which the grubs were located. With ordinary sized stools two doses of fumigant are usually sufficient; one on each side of the stool. If, however, any very large stools are encountered, three doses placed equidistantly round the stool should be enough.

Method of Injection with (A) Dank's Injector, and (B) Vermorel Injector.

(A) The Dank's Liquid Soil Injector consists of a brass container, above which are two wooden hand-grips, one on either side; a plunger with a dose regulator, around it in the form of a graduated collar. Below the container is a long spear with an adjustable footplate, below which again is a small aperture through which

the doses are ejected. Each dose is measured mechanically inside the Injector, and with each downward stroke of the plunger one dose is delivered.

The usual dose given is $\frac{1}{2}$ ounce, or $\frac{1}{4}$ ounce per stool (i.e., two $\frac{1}{4}$ ounce doses, one on each side of the stool). To obtain this, set the little pin in the graduated collar which is round the plunger stem, to "6." When applying the doses, do not insert the spear into the middle of the stool. Insert it into the ground some 2 or 3 inches from the stool, taking care to have the dose aperture directed towards the plant. Press the plunger down sharply. The depth adjustment for the doses is obtained by setting the distances between the lower side of the footplate and the dose aperture, to whatever is required, i.e., 2, 3, or as many inches as are necessary.

(B) The Vermorel Liquid Injector is very similar in appearance and construction with the Danks; the principal points of difference, however, are in the regulation of doses, and the fact that the expulsion chamber (not aperture) is attached just below the container tank, and independently from the upper portion of the spear.

Regulation of doses is effected by removing the split pin in the plunger cap, taking off the cap, and then slipping on to the stem or piston the brass rings which are supplied with the machine. The effect of this regulating is as follows:—Without any rings added, one downward stroke of the plunger delivers .36 or just over one-third of an ounce of liquid.

| | | | |
|------------------------|-------|---------|----------------|
| With one ring added | | .32 oz. | } approximate. |
| With two rings added | .. .. | .29 oz. | |
| With three rings added | .. .. | .25 oz. | |
| With four rings added | .. .. | .22 oz. | |
| With five rings added | .. .. | .18 oz. | |

This latter dose is approximately one-sixth ounce.

As five is the total number of rings that are supplied with this injector, therefore $\frac{1}{2}$ ounce is the minimum dose that can be obtained. This is slightly in excess of the minimum dose that can be obtained from the Dank's Injector, but the difference, although it takes slightly more material to treat an acre, is really hardly worth considering. Should, however, still smaller doses be required, no doubt a couple of extra rings could easily be made or procured.

It has been occasionally reported that immediately following fumigation, an excellent percentage of "killed" grubs has been obtained, but some weeks later some grubs have again been observed attacking the same cane roots, naturally leading to the belief that some of the grubs had recovered from the effects of the poison. In isolated instances where a grub has been just outside the range of the dose of poison at the time of fumigating, it would certainly survive, but the explanation given is that the "new invasion" is caused by the grubs that were feeding at the weed and grass roots between the cane rows, having travelled to the cane stools.

The actual period during which the bisulphide is able to kill the grubs is within the first twenty-four hours after application; therefore if these grubs reached the cane roots some days after fumigation, they would not be affected. Such a recurrence of grubs is preventable by having the spaces between the cane rows free from weeds, &c., for some little time before fumigation is actually carried out. This could be done say a week beforehand, then by that time the grubs would probably all be concentrated at the cane roots, and would therefore come under the influence of the poison.

Supplies of carbon bisulphide for fumigation are available to growers in the Mackay district, at a reduced rate of cost, on application to the Secretary of the Pest Destruction Board. Injectors, too, are also available through application to the same institution.

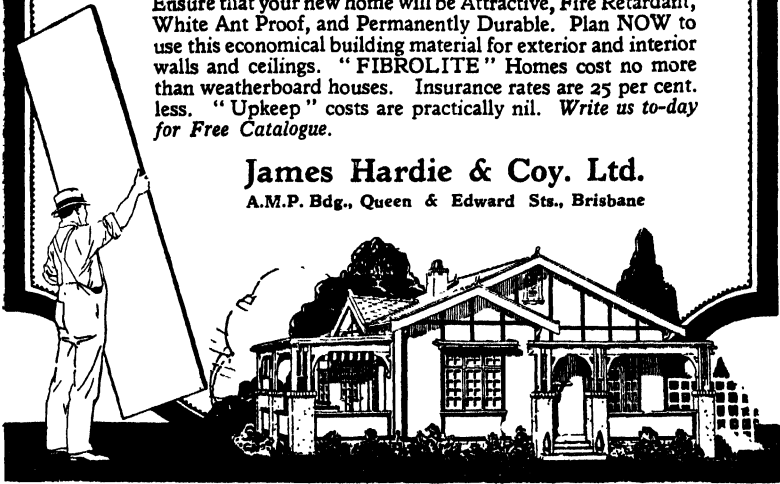
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INSECTICIDES*

By ROBERT VEITCH, B.Sc., Chief Entomologist.

The preceding chapter might be regarded by some readers as being of interest rather than of practical importance to growers. Such, however, is not really the case, for many points dealt with therein have an important bearing on the measures that may be adopted in combating insect pests, e.g. the varying structure of the mouth parts. The present chapter is, however, severely practical for it deals with the all-important subject of insecticides.

Insecticides are chemicals used in the control of insect pests. Their function is to kill the insect to be controlled without, at the same time, causing any appreciable degree of injury to the plant or animal host on which it is feeding or without injurious effect on the medium in which it may be feeding or breeding. Further important considerations in the choice of a chemical as suitable for insecticidal purposes are—firstly, its cost and method of application, which must be such that its use is economically sound and practicable; and secondly, its safety, in that it must be capable of being employed without danger to the operator when reasonable precautions are observed in its application.

The chemicals used as insecticides may be classified in three groups—firstly, stomach poisons; secondly, contact insecticides; and thirdly, fumigants. The choice of the particular class of insecticide to be employed in combating an insect epidemic will be determined partly by the conditions under which the pest is operating and partly by the feeding habits of the insect to be controlled.

Stomach Poisons.

As has already been pointed out in an earlier chapter many insects injure their host plants by actually biting off and swallowing portions of the foliage, fruit, or stalk of the plants on which they are feeding. Typical insects in that category are the army worm, the codling moth, the corn-ear worm, the cutworm, the fig beetle, the leaf-eating ladybird, and the pumpkin beetle.

The first four insects just mentioned pass through larval stages possessing chewing mouth parts which enable them to nibble off portions of the foliage, fruit, or stem of the attacked plants. The other three insects referred to possess chewing mouth parts, both as larvæ and beetles, and hence are destructive in two of their four life cycle stages, whereas the others are destructive in one only, the moths being incapable of injuring any part of the plant.

Spraying or dusting their food plants with poison is the control measure generally employed in combating the type of insect now under discussion. Some of the species, however, are more effectively controlled by the use of baits containing suitable poisons. On swallowing a certain amount of the poisoned food or bait, death rapidly ensues. For obvious reasons the materials used in this manner are referred to very appropriately as stomach poisons.

* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.R.S., and J. H. Simmonds, M.Sc., published by Department of Agriculture and Stock (Brisbane).

The insecticides belonging to this class are nearly all some form of arsenic which must conform to two conditions—firstly, it must be practically insoluble when made up into a spraying mixture, otherwise serious burning of the sprayed foliage will ensue; and secondly, it must be soluble in the digestive juices of the stomach so that it may be absorbed with fatal results to the insect that has fed on the poisoned plants or baits. When the insecticide is employed in the preparation of a poison bait only the second condition need be taken into consideration.

Arsenate of lead, Paris green and poison baits containing Paris green are later discussed in detail as being the most effective and most commonly employed representatives of this type of insecticide.

Contact Insecticides.

The earlier discussion of insect-feeding habits also showed that although many insects injured their host plants by chewing the foliage, fruit, or stem, another very important group was responsible for damage by piercing the epidermis or skin of the attacked plants and by extracting the plant sap through the punctures which they had made by means of their piercing mouth parts. In this class of insect the mouth parts are so developed that they are quite incapable of chewing, and their feeding is restricted to sucking plant sap just as a mosquito sucks the blood of humans. When the feeding habits of these sucking insects are considered, it is evident that it would be useless to attempt their control by arsenical sprays spread over the surface of their food plants. The surface tissue is never eaten by this type of insect and hence the poison would not be swallowed.

Stomach sprays of the arsenical type being impracticable for sucking insects assistance must be obtained from another class of insecticide, and it has been found that what are known as contact insecticides are very effective for the control of these sucking insects.

Contact insecticides owe their killing properties to a number of factors. The mortality produced by their application may be due to their corroding influence on the bodies of the insects covered by the contact sprays. They may suffocate the insect by the closure of the pores through which it breathes or, on the other hand, death may ensue as a result of the more volatile portions of the insecticide passing in through the breathing pores of the body.

Insects against which contact insecticides may be employed are well represented by the scale insects and aphids.

Kerosene emulsion, resin wash, miscible oils, nicotine sulphate, and lime sulphur are later dealt with in some detail as typical representatives of contact insecticides.

Fumigants.

Reference must now be made to the third class of insecticide—namely, fumigants. Fumigants may be employed against both the chewing and sucking type of insect, but difficulties are frequently encountered in their use and generally, but not invariably, they are employed only in enclosed spaces. Fumigants produce gases which kill by entering the breathing pores of the insect body and destroying the tissues or by suffocation following on the removal of oxygen.

The fumigants most commonly employed in Queensland are hydrocyanic acid gas and carbon bisulphide; detailed discussion of fumigants will be confined to these two insecticides.

Arsenate of Lead.

Arsenate of lead is without doubt the most suitable and the most popular form in which to use arsenic as a stomach poison on insect infested foliage. When mixed for spraying it settles slowly in the mixture and it adheres longer to the foliage than other stomach poisons such as Paris green. Further points in its favour are the fact that it does not at all readily burn the foliage, and its presence can easily be detected on the leaves, thus enabling the operator to make sure that the spraying has been complete and effective. It does not kill so quickly as Paris green, but is much safer to use on foliage.

Arsenate of lead may be bought either in powder or paste form. When the powder is used in the preparation of a spray it is essential that every particle should be well moistened before the arsenate of lead is added to the water. A thin paste, free from lumps, is therefore prepared by gradually adding small quantities of water to the powder until it is thoroughly wet. The paste prepared in the manner just described is then poured into the vessel holding the rest of the water to be used in the preparation of the spray.

Various formulæ are in use for arsenate of lead sprays, but one that has given satisfaction as a standard spray is—

| | | | | |
|-------------------------|----|----|----|-------------|
| Arsenate of lead powder | .. | .. | .. | 1½ lb. |
| Water | .. | .. | .. | 50 gallons. |

If the paste form of arsenate of lead is used the formula must be modified as follows:—

| | | | | |
|------------------------|----|----|----|-------------|
| Arsenate of lead paste | .. | .. | .. | 3 lb. |
| Water | .. | .. | .. | 50 gallons. |

Arsenate of lead is also frequently used as a dust instead of a spray, hydrated lime being generally employed as the carrier. Formulæ for the arsenate of lead dust vary from one part of arsenate of lead to ten parts of hydrated lime to as high a strength as one part of arsenate of lead to three parts of hydrated lime. Mention may be made of the fact that quite a number of proprietary dusts containing arsenate of lead are at present on the market.

Paris Green.

Paris green is much less popular as a spray than arsenate of lead, its lack of popularity being due to a number of factors. Firstly, it settles much more quickly in the spraying mixture than is the case with arsenate of lead, and hence it is difficult to maintain anything like a uniform strength of spray throughout the operation. Secondly, it does not adhere so well to treated foliage and consequently must be applied at more frequent intervals to ensure protection. Thirdly, it is not so safe to use owing to the fact that Paris green may contain an appreciable percentage of water soluble arsenic and such soluble arsenic will burn foliage. That difficulty, however, may usually be overcome by the addition of lime. The added lime combines with the soluble arsenic and reduces the danger of burning the sprayed foliage. Paris green possesses the advantage over arsenate of lead in the rapidity of its effect on insect life.

Paris green used as a spray should be prepared in accordance with the following formula:—

| | | | | | | |
|-------------|----|----|----|----|----|-------------|
| Paris green | .. | .. | .. | .. | .. | 1 lb. |
| Quicklime | .. | .. | .. | .. | .. | 1 lb. |
| Water | .. | .. | .. | .. | .. | 50 gallons. |

The Paris green should be worked up into a paste by the addition of a small quantity of water; then the lime should be slacked in a little water and added to the rest of the water. Finally the Paris green paste, which should be free from lumps, is added.

As in the case of arsenate of lead, Paris green may be applied as a dust, hydrated lime again being the ordinary carrier. Various formulæ show Paris green being used in the proportion of one part of the poison to from six to ten parts of the hydrated lime.

Poison Bran Baits.

Paris green has been referred to as presenting several unsatisfactory features when used as a spray, but in the preparation of poison bran baits employed in the control of such pests as cutworms it gives very good results. The danger of burning foliage no longer operates, and its relatively quick-killing powers render it more effective than arsenate of lead. A further attractive feature of Paris green is the greenish tinge imparted to the bait, thus enabling the operator to determine whether or not the poison has been thoroughly and uniformly incorporated in the bran.

Poison baits may be prepared in accordance with the following formula:—

| | | | | | |
|-------------|----|----|----|----|--------------------|
| Bran | .. | .. | .. | .. | 25 lb. |
| Paris green | .. | .. | .. | .. | 1 lb. |
| Molasses | .. | .. | .. | .. | 1 quart. |
| Oranges | .. | .. | .. | .. | 2 fruits. |
| Water | .. | .. | .. | .. | 2 gallons (about). |

The Paris green and bran should first of all be mixed together in a thorough manner and while still dry. The molasses and the finely chopped fruit and its juice should then be added to some of the water. The water containing the molasses should next be mixed with the bran and Paris green and the whole should then be well stirred up, enough water being added to produce the right consistency.

It is highly desirable that the poison bait should be of the right consistency, and only sufficient water should be added to permit of it being in a crumbly state and thus capable of being easily scattered broadcast on the ground. It should, at the same time, be sufficiently moist to permit of each flake of bran taking up its quota of Paris green and molasses.

Neither the fruit juice nor the molasses is essential in this bait, although they are usually considered desirable. Horsedung and sawdust have been substituted for the bran in certain formulæ, and smaller percentages of Paris green have also been used, but it is desirable to adhere to the formula given until such time as experiments have demonstrated the equal efficiency of cheaper formulæ when used in this State.

It should hardly be necessary to add that poultry and other domestic animals should not have access to areas that have been treated with poison bran baits.

Kerosene Emulsion.

Kerosene emulsion is one of the oldest insecticides employed against aphids and scale insects, but its use is now less general than was formerly the case. It possesses, however, one considerable advantage in the fact that all the ingredients required for its preparation can be readily obtained in any centre.

A common formula for the stock solution is as follows:—

| | | | | | | |
|-----------|----|----|----|----|----|-----------|
| Hard soap | .. | .. | .. | .. | .. | ½ lb. |
| Water | .. | .. | .. | .. | .. | 1 gallon |
| Kerosene | .. | .. | .. | .. | .. | 2 gallons |

The soap should first be dissolved in the water by boiling and, while the water is still hot, the kerosene should be added to it, but not in proximity to the fire. This mixture should be churned up violently by means of a small spray pump for about five or ten minutes. A good emulsion without trace of free oil should then be available. It is essential that the oil should be thoroughly emulsified because, if free oil is present, burning of the foliage may ensue. Soft water or rain water should be used in the preparation of kerosene emulsion, but if only very hard water is available it can be broken with lye. The stock solution prepared in the manner just described will keep for some considerable time, but some authorities maintain that it is preferable to prepare fresh quantities as required.

When required for use, the stock solution should be diluted by the addition of water. The proportion of water added will depend on the nature of the insect to be controlled, and also on the sensitiveness of the plant to be sprayed. Some authorities maintain that one part of the stock solution to fifteen parts of water is the highest strength at which foliage should be sprayed, while other investigators recommend a strength of one part of stock solution to ten parts of water and even less.

Mention has been made of the necessity of having the oil thoroughly emulsified to avoid the danger of burning the foliage. Attention has also to be directed to the fact that if much emulsion runs down the trunk of sprayed trees serious injury may be caused at or below the ground level. This danger may be avoided to some extent by building up a cone of loose earth at the base of the tree to be sprayed. Such a cone, 9 to 12 inches high and about 12 inches wide, will absorb an appreciable proportion of the surplus kerosene emulsion that runs down the trunk of the tree. After the tree has been sprayed the earth cone should be scraped away and, if necessary, the unsprayed portion of the trunk should be given a light spraying.

Resin Wash.

Resin wash is a spray that has enjoyed a considerable amount of popularity when employed against scale insects attacking citrus trees.

A formula recommended in New South Wales is as follows:—

| | | | | | | |
|------------------------------------|----|----|----|----|----|-------------|
| Caustic soda, 98 per cent. quality | .. | .. | .. | .. | .. | 5 lb. |
| Resin | .. | .. | .. | .. | .. | 16 lb. |
| Soft soap | .. | .. | .. | .. | .. | 6 lb. |
| Water | .. | .. | .. | .. | .. | 100 gallons |

The wash is prepared by boiling 10 gallons of water and adding to it the finely powdered resin, caustic soda, and soft soap. The mixture

should then be boiled for two or three hours. It should be frequently stirred and small quantities of hot water added from time to time until there is 20 gallons of the mixture. Hot water is used in diluting the mixture, 1 gallon of the mixture being used to 4 gallons of hot water.

Resin wash has its maximum efficiency as a spray when the young scales are hatching out. It should not be used when the trees are suffering from the effects of a dry spell.

Like kerosene emulsion, resin wash is now less used than formerly, and it has largely been supplanted by other sprays and by cyaniding.

Miscible Oils.

Miscible oils are mineral oils that have been treated in such a manner that they will mix quite freely with water. They have been extensively used during recent years as sprays for the control of scale insects.

Quite a number of proprietary brands of miscible oils are on the market and, as a rule, full instructions as to the mode of mixing and application are issued by the manufacturers. It is essential that these oils should emulsify properly, and that they should not be used at too great a strength, otherwise injury may result to the treated plants.

Nicotine Sulphate.

Nicotine sulphate is a spray that is enjoying a very considerable degree of popularity as a suitable insecticide against aphids, thrips, and other small and delicate insects. It is marketed as a highly concentrated tobacco extract, in which 40 per cent. of nicotine occurs in the form of nicotine sulphate.

This insecticide is generally used at a strength of one part of nicotine sulphate to eight hundred parts of water, a common formula being—

| | | | |
|---------------------------------|----|----|--------------------|
| Nicotine sulphate, 40 per cent. | .. | .. | $\frac{1}{2}$ pint |
| Soap | .. | .. | 2 lb. |
| Water | .. | .. | 50 gallons |

The soap is added to produce a better spread and adherence of the spray.

Nicotine sulphate is also often applied as a dust, hydrated lime being in many cases employed as the carrier. The proportions in this dust are generally 5 lb. of the nicotine sulphate to 95 lb. of the hydrated lime. Various proprietary dusts containing nicotine sulphate are now on the market.

Lime Sulphur.

Lime sulphur is one of the most important sprays used as an insecticide, and it possesses the further merit that it is also a valuable fungicide. It was formerly made on the orchard by boiling a mixture consisting of sulphur, lime, and water. The concentrated lime sulphur solution, however, is now manufactured commercially, and is largely used in place of the home-made article, the preparation of which is a decidedly unpleasant task. Home-made lime sulphur is further referred to in Chapter VI.

The concentrated solution must be diluted before being used as a spray, and in order to determine the exact amount of dilution necessary a Baumé hydrometer is used. This is necessitated by the fact that the strength of the concentrated solution varies quite considerably. The hydrometer is placed in the solution, and the number of degrees registered by it is noted. The reading on the hydrometer indicates the specific gravity of the solution, and by comparison with a table the necessary amount of dilution will be shown.

Carbon Bisulphide.

Carbon bisulphide is a liquid that evaporates very rapidly on exposure to the air, forming a heavy, highly explosive and inflammable gas. It should, therefore, not be brought into contact with a flame or highly heated pipes, and it is just as well not to smoke when using this fumigant. Although it does not possess the extremely dangerous properties of hydrocyanic acid gas, carbon bisulphide should, nevertheless, be treated with great respect, and the operator should, as far as is practicable to do so, avoid inhaling the vapour. . .

Carbon bisulphide is used principally for the fumigation of stored seeds that may be insect-infested, and it is also frequently employed in the destruction of ants' nests. It is a highly efficient fumigant for the purposes to which it is usually put.

It is generally considered that at least moderate temperatures are required to permit of satisfactory results being obtained in carbon bisulphide fumigation. Less than 60 deg. Fahr. has frequently been productive of very disappointing results, and a temperature of 70 deg. Fahr. or more is desirable.

When carbon bisulphide is used for the fumigation of seed a suitable container must be selected, and care should be taken to ensure that it is quite as airtight as is practicable. The seed to be treated is placed in the container and the fumigant is then added. As the gas produced by the evaporation of the liquid is much heavier than air, it is usual to place the carbon bisulphide in saucers or other vessels on the top of the material to be fumigated, so that the heavy vapour will be diffused through the whole of the enclosed space. As soon as the carbon bisulphide has been placed in the saucers, the container, whether it be a small box or a large iron tank, should be immediately tightly closed.

It has been demonstrated that under average conditions 4 to 5 lb. of carbon bisulphide per 1,000 cubic feet of container will produce satisfactory results in a reasonably airtight container if the insect-infested seeds are exposed to that concentration of fumigant for a period of about thirty-six hours. At the conclusion of the fumigation period the treated seeds or grain should be ventilated or aired.

It is well to remember that this fumigation will kill only the insects that are actually living in the seeds at the time of treatment. To ensure continued freedom from attack the fumigated seed should be subsequently stored in containers that are free from insect infestation, and are so constructed that they can be satisfactorily sealed up.

Hydrocyanic Acid Gas.

Hydrocyanic acid gas is quite the deadliest chemical in general use as a fumigant in insecticidal work. It has been largely employed in the fumigation of buildings, imported raw materials such as cotton, dormant nursery stock, and last but not least in the treatment of scale insect-infested citrus trees. The following detailed consideration of hydrocyanic acid gas as a fumigant will be confined entirely to its use for the last-mentioned purpose.

The citrus trees to be fumigated are covered by sheets or tents in order to confine the gas for a sufficiently long period to permit of the insects being killed. The sheets used should obviously be made from a reasonably gas-tight material, and for this purpose an 8-oz. special army duck is employed as being most suitable. It is a common practice to dip the new material in a tannin bath in order to minimise the chance of mildew and rotting. The size of sheets or tents employed will, of course, depend on the size of the trees to be treated.

The hydrocyanic acid gas required for the fumigation may be generated in any one of several different ways. Originally potassium cyanide, sulphuric acid, and water were used for its production, but in recent years sodium cyanide has largely replaced potassium cyanide in the pot method of generating the gas. A more recent development in California has been the use of liquid hydrocyanic acid gas. Other developments have been the use of a dust known as calcium cyanide, while a fumigant called Zyklon has also appeared on the market as a source of hydrocyanic acid gas.

The procedure adopted when the pot system of fumigation is employed is briefly as follows:—The tree to be fumigated is covered by a sheet or tent of appropriate size and the number of cubic feet represented by the space enclosed by the sheet is ascertained by reference to a table. This figure on the table indicates in other columns the quantities of sodium cyanide or potassium cyanide, sulphuric acid and water required to produce the correct amount of gas to fumigate such a space. The necessary quantities of these materials are then accurately weighed out or measured, and the requisite amount of water is first poured into an earthenware pot or dish. The measured quantity of sulphuric acid is then added slowly and carefully to the water. Great care must be exercised in adding the sulphuric acid, because if it splashes on the body of the operator it will inflict severe burns. The earthenware pot is placed under the sheet or tent at such a distance from the side of the sheet as to reduce to a minimum the danger of injury thereto by the splashing of the acid. As soon as the earthenware pot is in position the cyanide is dropped into it and a piece of sacking is placed over the pot.

It is essential that the cyanide should be added as soon as possible after the addition of the sulphuric acid to the water in order to obtain the best reaction. As soon as the cyanide has been dropped into the mixture of water and sulphuric acid that portion of the base of the sheet that has been raised to permit of the charging must be closed. It must be clearly understood that the hydrocyanic acid gas is generated very rapidly and is extremely dangerous, and hence the operator should on no account inhale it, and he should withdraw immediately the cyanide has been dropped into the pot containing the mixture of sulphuric acid and water.

In citrus fumigation the time of exposure of each tree to the gas is generally forty-five minutes, which is considered a sufficiently long period to permit of satisfactory results being obtained.

Fumigation with the pot system of cyaniding should be carried out at night, because then the danger of injury to the treated trees is materially reduced. It should never be done during the heat of the day nor in strong windy weather, and it is always well to exercise special precautions in fumigating weak trees. It is further desirable to make sure that the foliage and fruit on the trees to be treated are dry, and it is also generally advisable to avoid fumigating when a heavy dew is experienced. Fumigation of trees bearing an excessively large quantity of tender young growth may be attended with injurious results. A further precaution to be observed in connection with fumigation is that trees that have been sprayed with Bordeaux mixture should not be fumigated with hydrocyanic acid gas for at least six months after spraying.

A great deal of time has been devoted to the study of citrus fumigation in the United States, particularly in the State of California, and investigators in that country have expressed the opinion that fumigation should not be carried out when the temperature rises above 70 deg. Fahr. They also hold the opinion that there is some appreciable danger in fumigating trees carrying small fruit—i.e., at the period between the setting of the fruit and the time at which it reaches an inch in diameter. There is still a field for investigation on many aspects of citrus fumigation in the State of Queensland.

Fumigation, especially for the armoured scales such as red scale, is a very effective means of control. The gas generated penetrates to every part of the tree, and if it is of proper concentration employed under conditions that are both suitable and safe a very high percentage of kill will be obtained. One decided hindrance, however, to the extensive employment of citrus fumigation in Queensland lies in the cost of equipment, which is undeniably heavy if it has to be incurred by each individual orchardist. Where the gas is generated by the pot system, operations have largely to be confined to night work, and a further disadvantage arises from the fact that the sulphuric acid must be handled with great care. On the other hand, if spraying is adopted, the spraying of a heavy foliage tree such as citrus is no easy task, because no matter how painstaking the operator may be it is difficult to reach every portion of the tree.

The remarks on fumigation have so far been confined entirely to the pot system of generating the hydrocyanic acid gas. Attention, however, must now be directed to the recent extensive use in Australia of calcium cyanide dust for citrus fumigation. The procedure in using calcium cyanide is briefly as follows:—Firstly, observations are made to determine whether or not the conditions are favourable for fumigation, then, if the conditions are satisfactory, the trees to be treated are covered with sheets, the trees are measured, and the appropriate doses of calcium cyanide dust are poured out and blown in under the sheets. After the expiry of the necessary fumigation period the sheets are then moved on to the next set of trees to be treated.

The Department of Agriculture and Stock carried out a number of preliminary trials with this dust on citrus trees in several districts,

and in these preliminary trials, under the conditions then prevailing, good kills of red scale and white louse were obtained.

Where to Obtain Insecticides and Fungicides.

Many orchardists doubtless have their own agents or local dealers through whom they either do or can obtain their supplies of insecticides and fungicides, but, nevertheless, it frequently happens that the Department is asked where these may be obtained. For this reason it has been thought desirable to give the names of some of the dealers in or near the metropolitan area. The Australian Co-operative Fertilisers Limited, Roma street, Brisbane; Buzacott (Queensland) Limited, 371 Adelaide street, Brisbane; Southern Queensland Fruitgrowers' Association Limited, Cleveland; and Taylors and Elliotts Limited, Charlotte street, Brisbane, all handle various lines of insecticides and fungicides.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING FEBRUARY, 1929 AND 1928, FOR COMPARISON.

| Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | | Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | |
|-------------------------|-------------------|------------------------|-----------------|-------------|----------------------------------|-------------------|------------------------|-----------------|-------------|
| | Feb. | No. of Years' Records. | Feb., 1929. | Feb., 1928. | | Feb. | No. of Years' Records. | Feb., 1929. | Feb., 1928. |
| <i>North Coast.</i> | | | | | <i>South Coast—continued:</i> | | | | |
| Atherton ... | In. 9'44 | 27 | In. 21'07 | 18'11 | Nambour ... | In. 8'48 | 32 | In. 12'07 | 42'58 |
| Cairns ... | 15'24 | 46 | 28'02 | 16'12 | Nanango ... | 4'06 | 46 | 4'13 | 10'10 |
| Cardwell ... | 17'04 | 56 | 15'24 | 22'36 | Rockhampton ... | 7'06 | 41 | 36'37 | 18'01 |
| Cooktown ... | 18'04 | 52 | 26'68 | 23'42 | Woodford ... | 8'15 | 41 | 6'14 | 24'03 |
| Herberton ... | 7'36 | 41 | 14'63 | 13'60 | | | | | |
| Ingham ... | 16'05 | 36 | 18'48 | 31'45 | | | | | |
| Innisfail ... | 22'17 | 47 | 39'52 | 26'25 | | | | | |
| Mossman ... | 15'18 | 15 | 31'60 | 36'73 | | | | | |
| Townsville ... | 11'60 | 57 | 5'25 | 9'66 | | | | | |
| <i>Central Coast.</i> | | | | | <i>Darling Downs.</i> | | | | |
| Ayr ... | 9'07 | 41 | 4'15 | 20'64 | Dalby ... | 2'77 | 58 | 2'80 | 8'47 |
| Bowen ... | 8'87 | 57 | 4'74 | 13'07 | Emu Vale ... | 2'24 | 32 | 7'75 | 10'33 |
| Charters Towers ... | 4'49 | 46 | 4'86 | 5'14 | Jimbour ... | 2'65 | 40 | 1'91 | 3'65 |
| Mackay ... | 11'31 | 57 | 12'41 | 25'51 | Miles ... | 2'68 | 43 | 3'59 | 7'32 |
| Proserpine ... | 11'61 | 25 | 19'58 | 24'13 | Stanthorpe ... | 3'17 | 55 | 5'85 | 8'36 |
| St. Lawrence ... | 7'67 | 57 | 11'08 | 26'53 | Toowoomba ... | 4'22 | 56 | 10'37 | 15'17 |
| | | | | | Warwick ... | 3'01 | 63 | 6'72 | 8'65 |
| <i>South Coast.</i> | | | | | <i>Maranoa.</i> | | | | |
| Biggenden ... | 3'71 | 29 | 7'72 | 19'88 | Roma ... | 3'03 | 54 | 4'68 | 4'09 |
| Bundaberg ... | 5'96 | 45 | 10'73 | 13'18 | | | | | |
| Brisbane ... | 6'31 | 78 | 6'24 | 16'12 | | | | | |
| Caboolture ... | 7'06 | 41 | 6'72 | 23'35 | | | | | |
| Childers ... | 5'75 | 33 | 12'51 | 29'57 | | | | | |
| Crohamhurst ... | 12'50 | 35 | 6'45 | 38'01 | | | | | |
| Eak ... | 5'14 | 41 | 7'91 | 13'99 | | | | | |
| Gayndah ... | 4'11 | 57 | 8'39 | 12'14 | | | | | |
| Gympie ... | 6'39 | 58 | 10'78 | 18'20 | | | | | |
| Kilgarvan ... | 4'80 | 49 | 5'37 | 14'86 | | | | | |
| Maryborough ... | 6'30 | 56 | 3'21 | 17'37 | | | | | |
| | | | | | <i>State Farms, &c.</i> | | | | |
| | | | | | Bungewongorai ... | 2'49 | 14 | 3'94 | 1'70 |
| | | | | | Gatton College ... | 3'05 | 29 | ... | 12'09 |
| | | | | | Gindie ... | 2'90 | 29 | 5'98 | 3'28 |
| | | | | | Hermitage ... | 2'20 | 22 | 5'47 | 9'57 |
| | | | | | Kairi ... | 9'16 | 14 | ... | 16'61 |
| | | | | | Sugar Experiment Station, Mackay | 10'02 | 31 | 12'77 | 28'49 |
| | | | | | Warren ... | 3'76 | 14 | ... | 10'62 |

THE DAIRYING INDUSTRY IN QUEENSLAND.

ITS PROSPECTS IN THE CENTRAL DIVISION.

ADDRESS BY MR. W. FORGAN SMITH TO MACKAY ROTARIANS.

Queensland is the only country in the world in which dairying is being carried on successfully and on a large scale within the tropics. There are 52 butter and 73 cheese factories and 22,500 dairying establishments in Queensland, and it is estimated that 90,000 persons, or 10 per cent. of the population of the State, are dependent on dairying for a livelihood.

The amount of capital invested in the industry in Queensland alone is, approximately, £35,000,000—*Mr. Forgan Smith.*

"The dairying industry is a distinct advantage to Queensland. It affords an opportunity for settlement that is not available in other directions, and I believe its capacity for extension, not only in this State, but throughout the Commonwealth, is great indeed."

These words were used by Mr. Forgan Smith, Deputy Premier and Minister for Agriculture and Stock, to emphasise the importance of dairying, in an address to Rotarians at Mackay on 12th March. The dairying industry, he said, appeared to be a good business proposition for the Mackay district. It was of extreme importance and growing rapidly, every two out of three farmers in Queensland being engaged in it. This was the only country in the world where it was being carried on in the tropical area, which meant they had more problems to deal with than those countries engaged in the industry in the more temperate zones. There were 52 butter and 73 cheese factories, and 22,500 dairying establishments in Queensland, and it was estimated that 90,000 persons, or 10 per cent. of the population of the State, were dependent on it for a livelihood. The amount of capital invested in the industry in Queensland alone was approximately £35,000,000. Last year had been the biggest year in production since the industry was established here, and the Commonwealth statistician made the following statement in the Year Book so far as it was concerned. "The marked development of dairying in Queensland, where the butter production nearly doubled since 1913, was responsible for the largest share of the increased output in Australia, whilst Victoria and New South Wales also made important contributions to the general progress." The value of the industry in this State in 1914 was £2,393,402, and in 1927 it had increased to £7,250,000. That increase was represented in butter, cheese, and other dairy products.

Cream more Valuable than Gold.

It was also worthy of note that the value of the dairying industry in the Gympie district was far greater than had been the value of gold in the mining days. The quality of the product had also been improved, as a result of the Commonwealth and State Governments acting in conjunction, the idea being to place upon the markets of the world an article equal to that of any other country. In Queensland there had been distinct progress in this particular direction during the last few years, and since he had been Minister for Agriculture and Stock—a little over four years—eight entirely new butter factories had been opened, and additions had been made to quite a number of other factories. During his visit to New Zealand, which was an important dairying country, he had been given the opportunity of visiting some of the factories, and he found they were not ahead of the best equipped factories in Queensland. On the stock side, of course, the yield per cow was higher than in Queensland, due to some extent to better breeding and better feeding, as a more uniform rainfall enabled a more uniformly balanced ration to be supplied. In 1925-26 the Queensland percentage of first-grade butter and cheese was 68.3 of the total output, but in 1927-28 it had increased to 82.1. The higher grade butter represented a distinct advantage to the dairyman, as it provided him with a bigger cream cheque.

Science in the Dairy.

A considerable amount of work yet remained to be done in connection with scientific research. The production of butter and cheese in a tropical climate presented many problems that were not met with in countries such as New Zealand and Denmark, which were two big competitors on overseas markets. The figures he had indicated in regard to quality went to show that they were working along the right lines, and the technologists in charge of the industry were doing good work; progress would be so continued as the years went by.

Improvement in Production.

An important thing with regard to the future of dairying in Queensland was to continue not only the improvement of the factory side of the industry, to which those engaged in it were fully alive, but also to carry out improvements on the production side. No matter how well equipped a factory might be, unless they kept the cream delivery in a first-class condition it was impossible to turn out a high quality product. In that connection the Agricultural Department was doing a great deal in instructional work, with a view to stressing on dairymen the importance of good breeding and feeding. When one looked at the average return of butter-fat per cow in Queensland, it was not too much to expect that with proper breeding and feeding it could be increased from 150 lb. to 250 lb. a year. Proof of his statement could be established from the returns of those herds which were subject to departmental grade tests. The department tested herds free of cost with a view to ascertaining for the dairymen the cows which paid, and those which did not. Of those herds subjected to tests, some ranked as high as the average highest yield in other countries of the world.

The Better Bull Scheme.

With a view to encouraging the breeding of good herds the Government advances a subsidy of half the cost of a purebred bull to a dairyman with twenty head of dairy cattle or more. Arrangements had also been made with the shipping companies and the Commonwealth Government to give further inducements for the importation of stock from other countries. In Argentine the herds had been improved by the introduction of bulls from Great Britain, and that country would later be a competitor on overseas markets. The future depended not only on the volume of production, but on its excellence, which, when thoroughly established, would provide a good living in dairying.

The Industry in the Mackay District.

Continuing, Mr. Smith said he had followed with considerable interest the discussions that had taken place from time to time regarding the establishment of the industry in Mackay. Before starting a factory it was necessary to have an assured cream supply to commence with, as the security for any loan that might be required was not the building and equipment of the factory, but a continuous supply of cream to keep it going at its minimum capacity. There could be no doubt about the advantage of the industry being established here provided they proceeded along sound lines, and dairymen with experience in other parts of the State and Commonwealth would be a big advantage. There were lands in the district suitable for dairying, some of which were privately owned, and some of which was Crown land. It was proposed to open those areas for settlement. There was a considerable amount of land in the Bolingbroke resumption, behind Sarina, suitable for dairying as well as agriculture, and he intended to have an agricultural survey made of it when the weather was more favourable, to establish what those lands were suited for. From investigations made by his officers, some of the land there was suitable for dairying, and some for tobacco and banana-growing, both of which industries would be of advantage in the developmental work of Mackay.

The Call for Co-operation.

With regard to the proposed amalgamation, said Mr. Smith, one could readily recognise that to belong to an established organisation was a distinct advantage, as these were days when the best success was achieved in any industry by co-operation. One had to realise that no matter how good a business man might be, if he endeavoured to establish a new business there were certain losses inseparable from the initial stages. To have the experience gained by an established body was an obvious advantage. The control of the technical side of a factory was of extreme importance, and technicians

could be employed by large organisations that a small organisation could not afford to employ. He had noticed that Mr. Wilson had been here to discuss the matter of amalgamation, and the company he represented manufactured a large quantity of high-grade butter. It was not part of his duty as Minister for Agriculture to recommend an amalgamation of companies, as that was a matter the shareholders themselves would have to decide, but he would like to point out the advantages of belonging to an organisation that was in existence.

The Department of Agriculture advanced two-thirds of the cost of building a co-operative butter factory, provided the proposition was a sound one, and having regard to the principles he had previously mentioned. There should be no difficulty in finding portion of the money from that source.

The Industry yet in its Infancy.

A good deal remained to be done in connection with research in the dairying industry, and it had been proposed that a laboratory should be established by the Commonwealth Government to be worked under the auspices of the Bureau of Science and Industry. Certain preliminary investigations had been made, but one of the difficulties met with was to obtain the services of a man with the necessary qualifications, and so far very little had been done in connection with it. If the Commonwealth did not soon do something, it would be necessary for the State of Queensland to take action on its own behalf, and he proposed calling a conference in June or July of leaders of the industry and technicians to deal with the matter. Speaking at Murgon on the previous Saturday Mr. T. Flood Plunkett stated that the dairying industry in Queensland was only in its infancy, and in the next few years its expansion was bound to be greater than ever it had been.

A vote of thanks was accorded Mr. Smith for his address, at the instigation of the President (Mr. A. M. M. Calletly).

FLAVOUR DEFECTS IN MILK.

C. McGRATH, Supervisor of Dairying.

Flavour is so important that every attention should be given to aroma in dairy products. A high-grade food product must be free from "off flavours" and odours. Milk is subject to undesirable flavours and odours which if not eliminated detracts from its favourable appeal to the appetite for consumers, who assume that an "off flavoured" product is intrinsically bad. The products of "off flavoured" milk are usually wanting in the first essential in high-grade food products, that is, an appealing flavour and odour.

The causes of "off flavour" and odour defects in milk have been classified by research workers under these four headings:—(1) Abnormal physical condition of the cow; (2) absorption of odours at the time of milking and after; (3) odours arising from highly-flavoured feed consumed by the cow; and (4) flavours and odours due to biological changes in milk.

1. The Health of the Animal.

Milk secretion is a physiological function and is highly complex in its nature. Variation in the composition of milk is liable therefore to happen should the cow's system be not normal. An abnormal condition of an animal's health disturbs the chemical, physical, and physiological properties of milk, and detrimentally affects the flavour, the food, and market value of the milk and its products.

This is an important matter and calls for the special attention of the dairyman. Close contact with the dairy herd enables him to detect unhealthy animals, and the remedy is culling affected cows from the herd.

2. Flavours and Odours.

"Off flavours" and odours are absorbed during the process of milking, and subsequently, and include odours from tainted air arising from dirty sheds, yards, and unsanitary surroundings generally; also from fumes and oil odours where milking plants are in use.

All milking plants should be so located and erected as to protect the milk and its products from contamination.

3. Food Flavours.

The absorption of air-borne food odours such as silage and green lucerne has little influence on the flavour of the milk, while green maize, oats, wheat, barley, and hay could be fed during milking without imparting undesirable flavours and odours to the milk.

"Off flavours" and odours are imparted to milk through feeding highly-flavoured feeds, also from rank pasturage. From the results of research workers it is known that for the most part the food taint comes through the body of the cow, and not through absorption of taint from the surrounding air.

The food flavours and odours are transmitted through the stomach and lung walls direct to the blood, then through the mammary glands to the milk. In investigating the garlic flavour in milk it was found that its transmission was a matter of minutes only.

Green lucerne, silage, turnips, and rape, when fed to dairy cows, will give rise to undesirable flavours and odours in the milk.

Some foods, even when fed in large quantities, do not impart an objectionable flavour to milk and these include native grasses and many varieties of introduced grasses, also green maize, wheat, oats, barley, &c., well-cured hay, and many of the concentrates.

Investigation has proved that milk drawn from a cow within one hour after having eaten high-flavoured foods will carry a strong flavour of the food consumed. If longer than one hour elapses from the time the cows have eaten certain strong-flavoured food until they are milked the product is comparatively free from the "off flavour" and odour. Such foods should be fed to cows in profit one hour or upwards before milking time.

Many varieties of weeds (herbage) which thrive on cultivated areas and on scrub soils are among the worst offenders in imparting undesirable and, in some instances, intensely disagreeable flavours and odours, to milk, which are carried into the products manufactured therefrom, and depreciate their market value.

From careful investigations it has been found that a number of food taints are perceptible in milk produced three hours and upwards subsequent to the animal eating such foods.

Garlic flavour, for instance, is very pronounced and objectionable in milk. If a milch cow inhales the odour of garlic, its milk will absorb the garlic taint which will remain perceptible in the milk drawn up to seven hours after. When some foods possessing pronounced undesirable flavours and odours are consumed by cows in profit their milk has a pronounced "off flavour" and odour which is most difficult to remove by modern methods of pasteurisation and deodorisation.

Rank pasturage when grazed on, also produces a milk possessing an undesirable flavour.

4. Biological Changes in Milk.

The activity of micro-organisms bring about changes in milk and its product which give rise to a variety of flavours and odours some of which are desirable and others injurious and objectionable.

The means by which bacteria gain access to milk may be grouped thusly:—

- (1) Intra mammary.
- (2) Introduction in the course of milking operations.
- (3) Milk utensils.
- (4) Milking plants, coolers, and pasteurisers.
- (5) Contamination by dust, dirt, and maturing micro-organisms.
- (6) Contamination by absorption of impure air and surroundings.

The essential conditions for bacteria control in milk are healthy stock, sound nutritious fodder, the observance of sanitary principles pertaining to the production and handling of the milk and control of temperatures.

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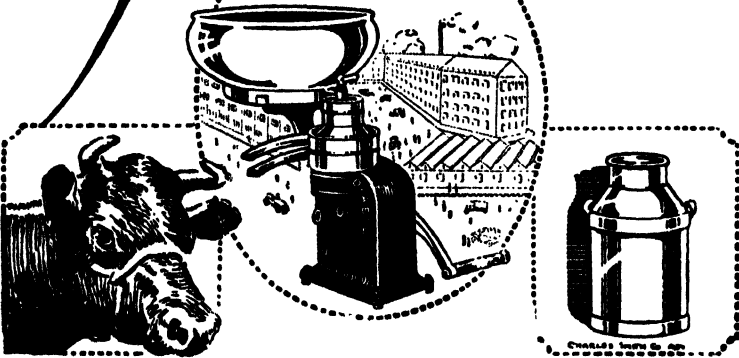
Miss Gladys Moncrieff.—"Heenzo is a blessing to those who suffer from chest and throat ailments."

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LOSS OF BUTTER FAT IN SEPARATING.

By F. J. WATSON, Dairy Instructor.

From results of tests of separated milk received from dairymen in different districts the fact is evident that loss of butter fat in separating causes very considerable monetary loss to many producers of cream.

Apart from losses through separators being out of order, or through wear and tear, one particular cause of loss of fat is very frequently met with, even when separators are otherwise in perfect condition. In many instances where hand-driven or small belt-driven separators are used the original cistern is discarded and a larger cistern or vat is substituted and fitted to a stand separate to the frame of the separator. It is frequently the case that this vat is fitted with a tap of different proportions to that on the original cistern, and when in operation this tap is usually in a position entirely different from that on the original container, thereby causing faulty separation. It may be observed that the tap of the cistern supplied by the makers of the separator is so fitted that when opened wide to admit milk into the separator bowl it permits the float to rise only to a certain height, and the float, in turn, prevents the milk from rising beyond a certain height in the funnel. The height at which the milk should be kept in the funnel is, in some makes of separator, marked on the inside of the funnel. When a substitute vat is used it is necessary that the height of the vat stand should be so adjusted that when the tap is wide open the milk will not rise in the funnel any higher than it would if the original vat were in use.

Using a Separator—Important Points.

In using the separator the following points are of importance:—

The separator should be run at the speed indicated by the maker throughout the time of separation. The separator bowl should not be over-fed by admitting milk into it too fast, as will be done when the tap and float are in the wrong positions as described.

Regulation of the milk flow should not be done by hand.

The correct speed of the bowl and the flow of milk should first be assured and then, and not before, should the cream screw be adjusted to obtain the desired percentage of fat in the cream.

The temperature of the milk is an important factor. If the milk is cold, separation is likely to be incomplete. The temperature should be about 90 deg. Fahr., and the separation should preferably be done while the milk is still warm immediately after milking.

It should be remembered that the separator has been made and adjusted by its maker to cleanly separate a certain quantity of milk at a certain speed and in a certain time, and that any variation in speed, feed, time or adjustment will result in faulty separation.

If the separator is run only a few turns per minute below its proper speed, or if it is fed with only a few gallons per hour beyond its intended capacity, there will be a loss of fat with which the adjustment of the cream screw has nothing to do.

The following table, compiled from actual experiments, shows loss of fat that may occur when the separator is not run at proper speed.

| Cream. | Loss when Separator was Run at Correct Speed. | Loss when Separator was Run 10 to 15 Turns Too Slow. |
|--------|--|---|
| | Per cent. Fat. | Per Cent. Fat. |
| 30 | 0.020 | 0.08 |
| 32 | 0.025 | 0.085 |
| 35 | 0.030 | 0.095 |
| 36 | 0.020 | 0.110 |
| 38 | 0.030 | 0.140 |

Running the separator over speed does not give any appreciable advantage in separating.

QUEENSLAND RAIN FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Pigeon-Berry Ash or Southern Maple is a large tree of the rain forests of the ranges of Southern Queensland and Northern New South Wales. In botanical nomenclature it is known as *Cryptocarya erythroxylon*. The trees have no prominent buttresses. The bark is pale and somewhat scaly; when cut it has a peculiar fragrance. The wood is also slightly aromatic, and is slightly pink when freshly cut. In appearance the wood is somewhat like Queensland maple, but is scarcely so ornamental. Nevertheless, the wood is a useful one for cabinet work and indoor building purposes.



[Photo., W. D. Francis.]

PLATE 85.—PIGEON-BERRY ASH (*Cryptocarya erythroxylon*).

A tree in the ranges to the east of Killarney.

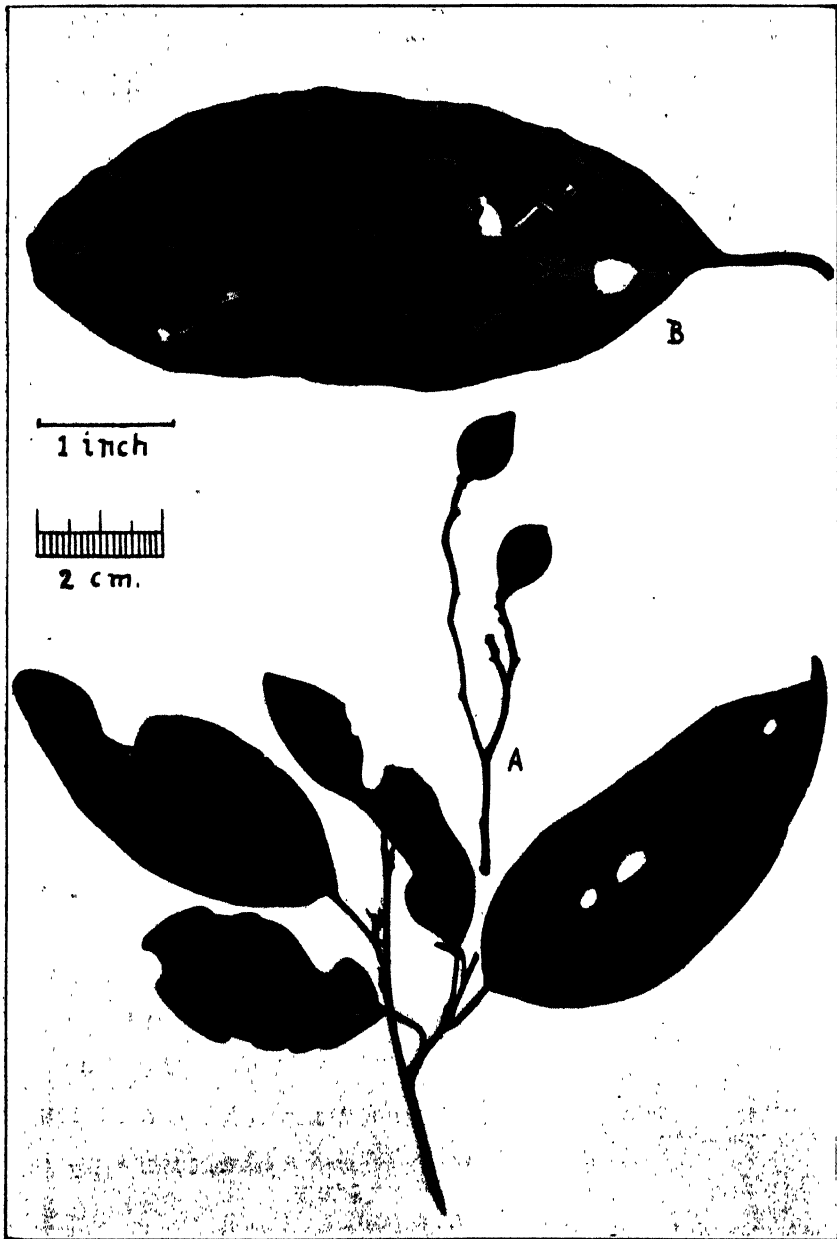


Photo.: Department of Agriculture and Stock.]

PLATE 86.—PIGEON-BERRY ASH (*Cryptocarya erythroxylon*).

A, Dry Fruits; B, Leaf showing underside.

WEEDS OF QUEENSLAND.

THE CORRECT BOTANICAL IDENTITY OF THE LANTANAS NATURALISED IN QUEENSLAND.

By C. T. WHITE, Government Botanist.

As a good deal of work is being done in Australia at the present time by veterinarians regarding the effects of Lantana on stock, the present notice is given defining those Lantanas naturalised in Queensland. As is well known, Lantana causes a disease in cattle known colloquially as "pink-nose."

In published reports of feeding tests with Lantana the species have been confused, for, unfortunately, the material experimented with not having been submitted to a botanist for correct determination.

The first record of the disease is by Tucker in the Annual Report, Department of Agriculture and Stock, Brisbane, 1910-11, p. 25. A further report was made by Pound in the Annual Report, Department of Agriculture and Stock, Brisbane, 1913-14, p. 109. There is undoubtedly confusion here, the red flowering Lantana referred to being the variety *Sanguinea*, and the pink flowering Lantana being the common *L. Camara*, not *L. Sellowiana*.

From the records so far published it would seem that both species are harmful, but the red flowering variety (*L. Camara*, var. *Sanguinea*) is by far the more virulent.

Lantanas are common in garden culture in warm temperate countries, and several forms of the common Lantana are recognised. Two red flowering varieties have been described—viz., var. *crocea* (*L. crocea* Jacq.) and var. *sanguinea* (*L. sanguinea* Medikus). These are very close, but I think the one naturalised in Queensland comes under var. *sanguinea* rather than the var. *crocea*, to which it has previously been referred.

1. *Lantana Camara* (Common Lantana).

Botanical Description.—A rambling shrub, stems 4-angled, the angles bearing short, somewhat recurved prickles. Leaves opposite, bright green above, paler beneath, averaging $2\frac{1}{2}$ in. long and $1\frac{1}{2}$ in. wide, but variable as to size, on short stalks about $\frac{1}{2}$ in., subcordate, rather pointed at the apex, scabrid (rough to the touch) above, the veins and veinlets clothed with white, rather soft hairs beneath, margins serrate-crenate. Flowers in heads of about 3 flowers, about 1 in. across, on stalks about as long as the leaves, opening pale cream with a dark yellow centre, dying off lilac or purplish. Fruit fleshy, purplish black when ripe, ovoid, about $\frac{1}{2}$ in. long, borne on the floral receptacle which becomes elongated, thickened and somewhat fleshy.

Distribution.—A native of tropical America, now widely distributed as a weed over the tropical and subtropical portions of the world.

Botanical Name.—Lantana, an ancient name of the Viburnum, which this resembles a little in foliage (Loudon); Camara, an old generic name of the Lantana.

Botanical Reference.—*Lantana Camara* L., sp. pl. 874.

2. *Lantana Camara* var. *sanguinea*.

Botanical Description.—Differs from the type in the flowers opening yellow and turning bright red.

Distribution.—A native of the West Indies, but now, like the normal form, widely distributed over the tropics and subtropics of the world. The variety is not so abundant as the type in Queensland, but is fairly widely distributed, and in some places is the dominating form.

Botanical Name.—Genus and species as above; varietal name *crocea*, Latin, meaning saffron-coloured.

Botanical Reference.—*Lantana Camara* L., var. *sanguinea*, L. H. Bailey (*L. sanguinea* Medikus in Act. Acad. Theod. III. Phys. 229).

3. *Lantana Sellowiana* (Small or Creeping Lantana).

Botanical Description.—A shrub, climbing in the absence of support, trailing along the ground, or weeping over rocks, &c.; branches slender, quadrangular in the young state, but soon becoming more or less rounded; unarmed. Leaves bright green above, paler beneath, rather small, averaging 1 to $1\frac{1}{2}$ in. long and about $\frac{1}{2}$ in. broad, but variable as regards size, on a stalk of about $\frac{1}{2}$ in., margins serrate-crenate, soft to the touch, covered above and below (particularly on the veins below) with scattered white hairs. Flowers in heads of about 20 flowers and about 1 in. across,

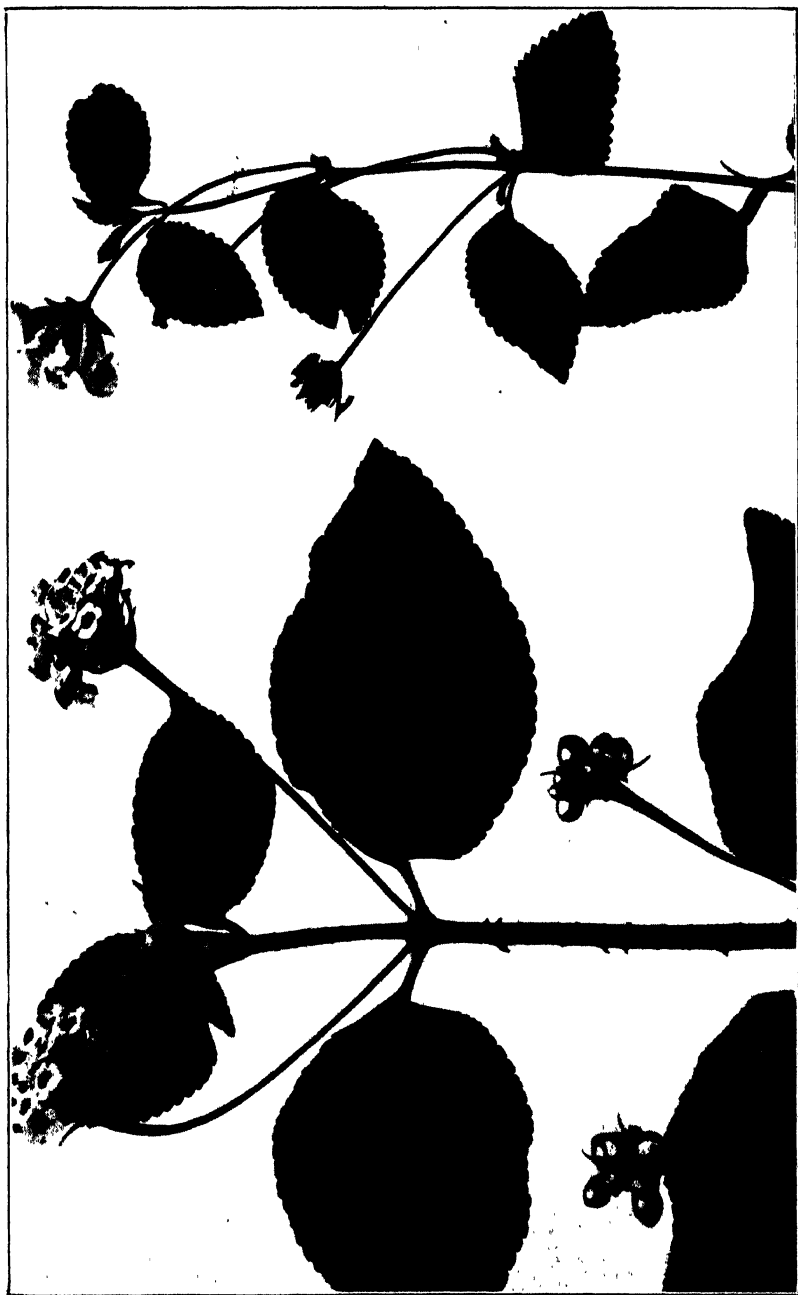


PLATE 87.

Left.—Common Lantana (*Lantana Camara*).

Right.—Small or Creeping Lantana (*Lantana Setouiana*).

in the leaf axils on slender stalks about twice as long as the leaves, mauve or light purple with a yellow throat, becoming darker and losing the yellow throat with age; outer bracts (subtending the flowers) broadly ovate forming a sort of involucre, inner ones successively narrower. Fruit a small reddish-brown drupe ("berry"), borne on the enlarged receptacle, bracts persistent.

Distribution.—A native of South America widely cultivated in tropical and sub-tropical countries as an ornamental trailer.

Common Names.—Small Lantana, Trailing or Weeping Lantana, Wild Verbena are names applied to it in Queensland.

Botanical Name.—*Lantana* (see under *L. Camaru*); *Sellowiana* in honour of Friedrich Sellow, a German botanist who travelled extensively in South America during the early part of the nineteenth century.

Botanical Reference.—*Lantana Sellowiana* Link and Otto, pl. sel. hort. Berol., p. 107, t. 50.

QUEENSLAND SHOW DATES, 1929.

The following is the official list of Queensland Show Dates for 1929, as issued by the Queensland Chamber of Agricultural Societies:—

| | |
|-----------------------------------|--------------------------------------|
| Miles: 3rd April. | Maryborough: 28th to 30th May. |
| Pittsworth: 4th April. | Marburg: 3rd June. |
| Chinchilla: 10th and 11th April. | Childers: 4th and 5th June. |
| Clifton: 10th and 11th April. | Lowood: 7th and 8th June. |
| Toowoomba: 15th to 18th April. | Gin Gin: 6th to 8th June. |
| Dalby: 22nd to 24th April. | Bundaberg: 13th to 15th June. |
| Goondiwindi: 23rd and 24th April. | Bororen: 17th and 18th June. |
| Nanango: 23rd and 24th April. | Gatton: 19th and 20th June. |
| Kalbar: 27th April. | Gladstone: 19th and 20th June. |
| Allora: 30th April and 1st May. | Mount Lareom: 21st and 22nd June. |
| Charleville: 1st and 2nd May. | Rockhampton: 26th to 29th June. |
| Taroom: 6th and 7th May. | Esk: 28th and 29th June. |
| Kingaroy: 2nd to 4th May. | Kileoy: 4th and 5th July. |
| Beaudesert: 1st to 4th May. | Townsville: 9th to 11th July. |
| Mitchell: 8th and 9th May. | Home Hill: 12th and 13th July. |
| Boonah: 8th and 9th May. | Samford: 12th and 13th July. |
| Wondai: 9th to 11th May. | Caboolture: 18th and 19th July. |
| Mundubbera: 8th and 9th May. | Rosewood: 19th and 20th July. |
| Blackall: 7th to 9th May. | Laidley: 24th and 25th July. |
| Ipswich: 14th to 18th May. | Nambour: 24th and 25th July. |
| Roma: 14th and 15th May. | Maleny: 31st July and 1st August. |
| Springsure: 15th and 16th May. | Bowen: 31st July and 1st August. |
| Murgon: 16th to 18th May. | Maleny: 31st July and 1st August. |
| Gayndah: 15th and 16th May. | Nundah: 3rd August. |
| Goomeri: 21st and 22nd May. | Royal National: 12th to 17th August. |
| Wallumbilla: 21st and 22nd May. | Goombungee: 30th August. |
| Biggenden: 23rd and 24th May. | Malanda: 18th to 19th September. |
| Emerald: 23rd and 24th May. | Beanleigh: 27th and 28th September. |
| Toogoolawah: 24th and 25th May. | |

CARE OF CHURN AND WORKER.

The importance of keeping the combined churn and worker in a satisfactory condition must not be overlooked. As the period of service increases extra care is required in order to keep the wood surface that comes in contact with the cream and butter in a clean and sanitary condition.

The liming of the churn once a week will be found beneficial. This operation is carried out by placing in the churn, which has previously been thoroughly cleansed and scalded, approximately 50 gallons of warm water (120 deg. Fahr.), to which is added about 10 lb. of slacked lime. The churn is then revolved for ten to fifteen minutes at intervals of one hour. The lime solution should be held in the churn overnight, the churn being made airtight to prevent the lime from drying out on the wood surface. The following morning revolve the churn for five or ten minutes, run off the lime solution, and thoroughly rinse the churn with clean cold water to remove all particles of grit or foreign matter.

Before use the churn should be scalded and cooled in the usual way.

HINTS FOR TRACTOR OWNERS.

THE "FIERCE" CLUTCH AND THE LEATHER-FACED CONTACT SURFACE.

By E. T. BROWN.*

The clutch mechanism calls for very little attention apart from keeping it lubricated. It is necessary, however, to adjust it from time to time, but this is a simple matter, and only takes a few minutes. As a general rule, the spring that forces the contacting surfaces together can be regulated, and in this way any slight alteration that is needed can be brought about. When one of the contacting surfaces is leather-faced, as is frequently the case, it may be necessary to dress the leather with some suitable oil to make it "bite" more firmly. When this is necessary the fact is known since the clutch is fierce—that is, it fails to slip slightly when the clutch is being engaged. A fierce clutch causes the engine and transmission mechanism to engage too suddenly, with the result that a severe strain is imposed on the parts concerned. If this fierceness be noticed, the clutch should be disengaged and held in that position by means of blocks of wood, or any other material suitable for the purpose, while the leather is being dressed. The leather should be thoroughly cleaned—with petrol if oil-smearcd—and then dressed with colan oil. It is sometimes suggested that castor oil should be employed for this purpose, but although it may be used when colan oil is not available it is not nearly so good. The oil should be allowed a few hours, with the clutch disengaged, to soak well into the leather.

The Driving Chains.

The driving chains, when these are employed as part of the transmission system, play a very important part in the efficiency of the outfit. For this reason they should be looked after in a proper manner. It is not enough to oil them occasionally. Owing to the nature of the work done they very quickly become clogged with dirt of one kind and another. The need for attention to this part of the outfit does not only arise from the question of damage to the parts concerned, but unless the chains work freely more power is absorbed for propelling the machine and less is available at the draw-bar. If the chains be kept clean and well greased there will not be much chance of the dirt penetrating the working parts of the rollers, but even that on the outside will make the whole work less easily. All mud should be scraped off every time the tractor is used and a liberal supply of grease should be applied. Before running the machine again oil should be added to the grease so that the two together will permeate the bearings. Occasionally it is a wise plan to take off the chains, brush them with kerosene, and soak them afterwards in melted tallow. In addition to keeping the chains clean and lubricated it is essential to see that they are adjusted correctly. The best results are obtained when there is a certain degree of play. The upper part of each chain, between the two sprocket wheels, should give 2 to 2½ in. when forced upwards. This, generally speaking, is the best setting for the majority of tractors. Adjustment is simple. All that is required is to shorten or lengthen the radius rods by means of their screwed ends. It is important to see that both chains are working with the same degree of play, otherwise a severe strain is put on the transmission.

Starting up the Engine.

No tractor engine is particularly easy to start-up. But by priming and making use of the impulse-starter or the decompressor, if either be fitted, and knowing how to swing the engine, it becomes more easy. Most tractors are fitted with dual tanks. One—the smaller—contains petrol for starting-up; the other kerosene, the fuel used when the machine is at work. The reason petrol is employed in the first instance is that it is more volatile, and therefore gives a better firing mixture when cold. Before attempting to swing the engine the spark should be retarded. If advanced the engine backfires, and may cause serious injury to the operator. The spark is always timed to occur before the end of the compression stroke when the engine is "revving" normally; if set in the same position when the engine is being rotated slowly by hand it occurs long before the end of the compression stroke. The firing of the mixture thus early naturally results in the piston being forced in a backward direction. Incidentally it may be mentioned that one make of tractor is fitted with a patent device that renders a backfire impossible. To save turning the engine too much by hand the cylinders should always be primed. The compression taps should be opened

*In the "Farmer and Settler."

and a little petrol injected into each cylinder; if no such taps be fitted the sparking plugs must be taken out and the petrol injected through these openings. The engine should then be given two complete turns, so that the fuel vapour in one cylinder is fully compressed and on the point of firing. If the engine be well tuned, with every part properly adjusted, it should start up at this stage with one strong pull up of the starting handle. A little bother beforehand saves a vast amount of swinging—always a laborious job on any except the smallest machines.

BORDER STOCK RESTRICTIONS.

The relaxation of restrictions on the introduction into New South Wales of stock from Queensland has been the subject of repeated representations made by the Minister for Agriculture and Stock, Queensland (Mr. W. Forgan Smith), to the Minister for Agriculture, New South Wales (Mr. H. V. Thorby).

It has been contended by Queensland stockowners, supported by the Stock Department in this State, that these restrictions are harassing, and in some instances unjustified. It is maintained that there is no necessity for the drastic provisions in New South Wales regulations dealing with the introduction into that State of Queensland stock which have been depastured in areas free of the tick and maintained tick free for years.

As a result of these representations Mr. Forgan Smith has now been officially advised that a proclamation has been issued under the New South Wales Stock Act, which provides that the country between the Western Railway and the Great Dividing Range, from Toowoomba on the east to the Miles-Wandoan Railway on the west, has been included in the area known as Schedule "T."

As a result of the inclusion of this country in Schedule "T," all cattle which have been in the area referred to for the preceding three months prior to removal to New South Wales are now eligible for entry into that State after receiving one dipping under official supervision in an approved dip, and another dipping on arrival at the border within a period of from five to fourteen days. This is a considerable concession, in that from three to four dippings were hitherto required to permit of the introduction of cattle into the adjoining State, and cattle by road from the new portion included in Schedule "T," the area north of the railway, were not eligible for entry into New South Wales until they had been south of the Western Railway for a period of three months.

In addition to the proclamation referred to, a previous proclamation was issued modifying the restrictions on the movement of cattle into New South Wales from that part of Queensland described in their regulations as Schedule "Z" to permit of entry into New South Wales at the border on one dipping, provided the cattle have been in Schedule "Z" or Schedule "W" for a period of three months.

It is understood that the New South Wales authorities have under consideration the removal of the line described as "K" from a point between Tallwood and Miles to a point east of Goondiwindi, and an inspection has been arranged by the New South Wales Stock Department of the area in order to locate a suitable position for the line.

UNSEEN FRIENDS AND FOES.

What makes milk and cream sour and causes the ripening of cheese? What causes scour in calves, tuberculosis in cattle, and diphtheria in children? The answer is bacteria, which are also called germs and microbes.

These micro-organisms are so small that they cannot be seen with the naked eye, but can be seen and distinguished through a microscope. Large numbers of them can find accommodation on the point of a needle. All are not harmful, and many species of micro-organisms are necessary for furthering the work of man in his varied industrial and scientific activities. Some, however, are harmful, and scientists are constantly seeking means to destroy them. The means used to fight germs are called disinfectants. Fire, heat, boiling water, and live steam are in common use as disinfectants or germ destroyers. The cheapest disinfectant and one that is available on every farm is direct sunlight. Sunlight is an effective germ destroyer, and we should make more use of it. Limewash is a good disinfectant for wood work of sheds and dairy premises. Sunlight and limewash are aids in the maintenance of sanitary conditions on the farm.—C. McGAATH, Supervisor of Dairying.

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power farmer's time.*



The soil was hard
stubble run to sheep
you know how tight they
tramp it and it was
dry as a bone mill.

They discussed plough-
ing The Tractor
Owner said: "I'll wait for
half an inch of rain"
but the S.V.T.R.* was per-
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on Voco Power and she'll
walk away with it," he said.
. so the T.O. "filled
her up" and she did!
. Astonished, the T.O.
asked: "How is it VOCO
pulls like that?" . . . and the
S.V.T.R. replied (with
pride): "It's a real 'knock-'
proof fuel all power
. and every drop's a
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GUARANTEED BY THE COMMONWEALTH GOVERNMENT

THE BUFFALO FLY PEST.

STATEMENT BY THE PREMIER.

The Premier, Hon. W. McCormack, informed the Press recently that he had read the reply made by the Prime Minister (Mr. Bruce) to the question asked by Mr. Grosvenor Francis relative to the Buffalo Fly pest. The Prime Minister is reported to have said that "the work now being carried out to combat the Buffalo Fly pest is being done by the Council for Scientific and Industrial Research. He did not recollect whether any assistance had been rendered by the Queensland Government, but would investigate the matter."

The Buffalo Fly has been known to exist in the Northern Territory for more than a quarter of a century, and has been a pest to cattle in the northern part of Western Australia for many years. Its presence is known in a part of north-western Queensland as a pest which spread from the Northern Territory, and is affecting the herds of cattle-owners in two of the States of the Commonwealth. The Queensland Government is of opinion that the control of the pest should be treated as a national matter, and advised the Commonwealth Government to this effect.

Activity of the Queensland Government.

In 1925 the Council for Scientific and Industrial Research arranged with Mr. Murnane, Bachelor of Veterinary Science, to visit the northern parts of Western Australia and the Territory with a view of submitting a report upon the incidence of the Buffalo Fly in those areas. In December, 1926, Mr. Murnane submitted a report upon his findings and, inter alia, stated that the Buffalo Fly was, at that time, within 70 miles of the Queensland border. In January, 1927, the Prime Minister was communicated with and requested that every effort should be made to bring the pest under control within the Territory and obviate the danger of its spreading into Queensland. The Queensland Government offered to co-operate, through its officers, with the Commonwealth Government. It was further suggested that urgent investigations should be carried out by the Commonwealth Authorities with a view of restricting the spread of the fly. The Federal Government failed to take any action that would be efficacious in restricting the spread of the pest, and in March, 1928, the Prime Minister was then advised of its seriousness to the pastoral interests of this State, and a suggestion was made that a buffer area should be declared in that part of the Northern Territory adjoining the north-western boundary of Queensland. This suggestion was not acted upon, nor was any other action taken that was likely to be efficacious in the removing of the danger of the introduction of the fly into Queensland.

State Departmental Action.

Although the available reports indicated that the fly was some distance from the Queensland border, the State Government did not relish the inactivity of the Federal Authorities in attempting to cope with the position, and in July, 1928, arrangements were made for an officer of the Department of Agriculture and Stock, in the person of Dr. John Legg, D.V. Sc., to make an inspection of the north-western part of Queensland and the border of the Territory and report. Dr. Legg advised that he had not been able to detect the presence of the fly at the time of his visit, but was informed that the stock on portion of a Queensland holding bordering on the Territory were infested with the fly during the wet season. A copy of this report was made available to the Commonwealth Government and in August, 1928, the Prime Minister was advised as to the position and the seriousness of the introduction of the fly into Queensland from the Territory, and the request was again made that a national view should be taken of the possible spread of the Buffalo Fly, and a recommendation was made that certain properties be resumed by the Federal Authorities and an effective buffer area established. To effectively remove the possibility of the fly being carried by travelling stock from the Territory into Queensland through the stock crossing at Wollongorang, this crossing was closed in October, 1928, and the Commonwealth Authorities were notified accordingly.

In order to determine definitely whether or not the pest had extended from the Northern Territory to the holdings on the Queensland border, arrangements were made for Messrs. Smith, Entomologist, and Clegg, Stock Inspector, to visit that part of Queensland and report. The report of these officers indicated that the Buffalo Fly was present on stock on these holdings. A copy of the report was made available to the Federal Authorities and the Council for Scientific and Industrial Research. Upon the discovery of the fly on the holdings referred to these areas were placed under quarantine and incidentally the movement of stock from such holdings prevented.

Queensland Authorities Fully Alive.

From the foregoing it will be noted that the Federal Government has been fully apprised of the position from time to time. A definite proposal was made to that Government in January, 1927, and in subsequent communications this proposal was reiterated, but to date this Government has not received any definite advice as to whether or not the Federal Authorities are prepared to treat this matter as one of national importance nor have they suggested any alternative to the proposals made by this Government.

The Department of Agriculture and Stock, through its officers, has been closely co-operating with the Council for Scientific and Industrial Research, and a clear understanding has been arranged with that body as to the manner in which the entomological investigations are to be carried out. The matter of bringing this pest under biological control has suggested itself and it is in this sphere that the science workers, associated with the Council, at present are engaged. Unfortunately, the position is that if success is achieved along these lines, it will be some considerable time before the spread of the fly will be checked, and in the interim there is the grave possibility that the fly will spread further eastward. This Government informed the Commonwealth Government of its willingness to co-operate in any proposal that may be considered effective in controlling the spread of the fly, but while the Commonwealth Authorities maintain an attitude of "do nothing" it becomes rather a difficult matter to furnish particulars of any good that has been achieved. On the other hand the particulars herein supplied clearly indicate that this Government has done all that has been humanly possible under the circumstances, and in the event of the Commonwealth Government advising that they are not prepared to deal with this matter as it should rightly be dealt with—that is, on a national basis—this Government will take such further action as may be necessary to keep the fly within restricted limitations.

THE CULT OF THE COLT.

By "U 9 L."*

VIII.

TAMING THE OUTLAW.

The colt we tackle this time is a sour brute of a thing, one with no more breeding than a Hun, and verily its ideals of honour and sportsmanship are unspeakable. All our blandishments are contemptuously hit to leg, as it were, and try as we will we can't get in touch with the thing at all. By that latter I mean in a mental sense. Physically we can put out hands on it, but mentally and morally we're outside the yard. I'm not going to weary you with the tedium of handling a colt of this sort—there's enough real trouble in the world without looking for it on a sheet of paper—and just in the process of running through there may be an odd point which is worth consideration.

We throw the ropes on the colt. Immediately in a squealing fit of rage it bucks round and round the yard, kicking and striking at anything and nothing, and it ends by entangling itself like unto a fly in a spider's web. Now, that's a nice mess, isn't it? The thing has shown by its actions that it's not fit company for a white man, and yet we have to untangle it. It's hazardous work; but it's got to be done. There's one point we've overlooked, though. With that last flying lash of its hind feet the colt nicked a bit of vein on its other hind leg, and from that cut the blood is squirting. There's no danger of him bleeding to death—such rubbish as this doesn't ever meet an untimely end—and we've got to staunch that flow after we have the ropes off.

The trouble, though, is to get them off. It's no trouble at all! As sure as ever a snorter pricks its own bubble by letting a bit of blood from itself, that cools its fiery temper and quells its unruly spirit. In its own imagination perhaps it thinks

* In the "Pastoral Review for December, 1928. Previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928), January, February, and March (1929) "Journals" from the February, April, May, July, September, and October (1928) numbers of the "Pastoral Review."

itself bleeding to death, and its feeble ounce of pluck is gone. When a thing of that sort has bled a bit—not more than about an egg cup—it's as tame as Mary's little lamb. It hasn't the guts to resist, it hasn't the desire to fight, and it stands helpless and harmless while you do with it what you wish. There may be exceptions to this; but I've never met 'em, and I've had it happen with more than a few. In fact, let me whisper, on real bad 'uns I've taken an ounce of blood on purpose and found it act as I desired every time. Mind you, I don't say it was good for the colt. But the sort of thing to which I refer had no good in it, so it didn't matter anyway.

If the blood is flowing freely and won't stop when you reckon it should, the easiest, if not the best way to stop it is with a pin and horsehair. Pin the lips of the wound together—just slip the pin through any old way and don't worry about making a neat job of it. Then get a long hair from the horse's tail and wind that figure of 8 backwards and forwards over and round the points of the pin. In next to no time at all the blood will clot on that hair and caulk the wound, stopping the bleeding.

Now, before going further, let me have a word or two to say about temper. Temper, like charity, covers a multitude of sins, and there are tempers and tempers. For the surly, stubborn, broody, and sluggish tempered horse I wouldn't give you threepence a dozen or accept them as discount thrown in on a pound of tea. And for the thing without any temper at all I wouldn't return anything but curses. You know the latter type of horse. It's the sort which is always falling over itself in an effort to please you, which never does anything wrong when you're looking, and which is an abomination on the face of the earth.

The Colt with a Bit o' Devil.

But when a man gets a colt with whips of devil, with a snap and sparkle in its moods, then he's got something for which he should return thanks. Above everything else give me a horse that's a contrary little cuss, that fights clean and wholesome, and one with individuality and a spirit and soul of its own. Give me something that's so darned contrary it won't admit it's beat, and when the dry sweat's caking its body, and when its breath comes in choking sobs, when it's so weary it can't lift its feet clean from the ground, then will that contrariness and devil rise superior to circumstances and its spirit will see you in blazes before it'll admit it's beat. Yes, give me devil without spitefulness, snap and sparkle without sullenness, and fight without vice and I'll show you what a horse is and what it can do.

Unfortunately, we're not handling a thing of that sort now. This that we've got is a negative proposition. Kicks! Why, my dear old sir, the thing kicks just for the fun of it. Can we cure it? I'm afraid not. Some people advocate hanging a bag of earth in a stable and letting the horse kick to its heart's content. Every time that horse kicks the bag it comes back and knocks him harder. The horse may get tired; the bag keeps coming all the time. In theory that may be right. In practice it's a blank. It's only teaching a horse to kick. Try it if you wish; but don't blame me if you get hurt.

Curing Kicking with Confidence.

The only thing which will stop kicking is confidence. Kicking, nine times out of ten, is prompted by fear and is used as a means of protection. You've got to overcome that fear, and in overcoming it you've got to show the horse that you're not afraid. Mind you, this is a fool's game, but it can be done, and there are lots of fools in the world. Move about the horse, walk behind him, lay yourself open to a knock or two, and keep your eyes peeled and your legs under you that you don't get it. If by any chance you happen to be standing in the corner of a yard or stall and a horse, any horse, swings round on you and brushes your face with the butt of his tail, that's the time your heart skips a beat or two and jumps to your mouth. There's only one thing to do; stand perfectly and absolutely still. It takes doing, let me tell you, but it's best done unless you're as sloppy as greased lightning in your actions. Usually the horse doesn't know you're there. If you move you frighten him. If he's frightened he takes the only means he knows to protect himself from behind. Keep still, pray if you wish, and look for a chance to slip out of harm's way as easily and as soon as possible. Another way you may nullify a kick is by dropping your hand on the hamstring—the Achilles tendon, to air the only bit of anatomical knowledge I possess. That has a paralyzing effect on that hind leg.

The Striking Habit.

When we go to slip the halter over the ears of the thing we're handling now it shows touchy about the ears, swings its head away in a wild sweep, and perhaps both fore feet whizz through the air and smack the ground beside us. Such things do happen, you know. Mobs and mobs of horses are touchy about the ears. More often than not that touchiness is expressed when the bridle is being taken off, and they submit without trouble to the thing going on. In fact, with some of 'em, it's a dickens of a job to get that bridle off their ears.

There's no cure for this—none that I've found, anyway. It's merely a case of custom, over and over again, and soothing words all the time. I've seen them so bad that they had to be roped to a post, or one front leg tied up, before the bridle could be taken off them. But with care they come to it in time. They'll always be a bit ticklish about the ears; but so long as a man doesn't infringe too greatly they aren't more than a little bit of a nuisance. That striking habit is something the same as kicking—it has to be overcome by moral suasion. It's no use taking a stick to a thing of that sort when the horse is young. In very rare cases, in later years, a stick may have a beneficial effect. And, again, it may only provoke an added outburst. Moral suasion's a winner every time when handling colts. Its effect bites deeper and the results are more lasting.

After an infinity of trouble we teach this slug which we have in hand all the other rules of the curriculum, and now we try and induce it to lead. Needless to say, and as we expected, it won't! It takes a couple of steps stubbornly, its head held forward and its tail jammed, and all the soft words and lollied blandishments we toss the thing don't penetrate skin deep.

When it is You or the Colt for it.

We try again. This time it comes with a run—it comes on its hind legs, with its mouth open, and with sudden death attached to the pedal extremities of its two fore legs! Now you're up against it, sir. This is distinctly a breach of good manners that can't be tolerated in any decent school. You've nothing in your hand but a bit of a harmless strap that wouldn't inconvenience a mosquito; you've got a raging devil in front of you, and I can tell you from the bottom of my heart that at no other time during this journey through life does a man feel so altogether helpless and alone. You've nothing in the yard with which you may defend yourself, and it's you and the colt for it. Which is going to win?

That depends entirely on the stuff of which you're made. You know there's a bit of a spreader outside the yard—a lovely bit of a stick about 3 ft. long and an inch through, and you'd give sixpence out of your own pocket to have it in your hand. But you daren't leave that yard till you've asserted yourself and proved to that dumb brute beast of the field before you that you're a better man than he is. You're up against it, and you've got to assert yourself. There's only one thing to do; you've got to go on with what you were doing—the same that induced the charge but a minute ago—and by will power alone must you subdue any insubordination. It takes doing, let me tell you, and though your voice may take a domineering note, your mind is quailing—and I don't blame you.

Stopping a Charge.

When you've proved to that colt that you're a better man than he is—he the proof ever so little—then go and get the stick. Now your spirit rises in strength, now your voice rings true, and now you tell that colt to do his darndest. In fact, he has to be made to charge. If he won't do it of his own accord he's got to be goaded into it—he did it once, and he's got to learn it can't be done again. The first time you proved to him that he couldn't frighten you, and the second time it has to be proven that you can frighten him.

He comes! No he doesn't! He started to come; but you used that spreader with judgment. Smash! It got him along the forehead, and that colt stands in the corner of the yard and shakes his sulky head. He's had enough, and you're boss. But if a lesson has to be made drastic it must be driven home with emphasis. Again and again that colt is goaded to charge, and every time it so much as lops its ears or rolls the whites of its eyes it feels the might of man in his power. It's cruel; but it's got to be done.

By the way, a charging horse may often be stopped by hitting it solid with the heel of the palm of the hand on the point of the nostrils. It may not be as efficient as a stick, and it can't be followed up and driven home as with a stick; but I know it stops them more often than not. Why, bless you, I've been stopped myself in that way, so why shouldn't a horse do the same?

THE COTTON INDUSTRY AND THE TARIFF.

STATEMENT BY THE MINISTER FOR AGRICULTURE.

The Minister for Agriculture (Mr. W. Forgan Smith) informed the Press recently that he was much concerned about the decision of the Federal Government to defer for some months at least the matter of consideration of the Tariff Board's report upon the cotton industry. The inexcusable procrastination of the Federal Government in relation to the industry was lamentable, and both the growers and the spinners of cotton would be adversely affected as a result of the delay that has occurred.

The specious special pleading indulged in by the Minister for Trade and Customs (Mr. H. S. Gullett), in making the announcement in the Federal Parliament, was a clear indication that in its report the Tariff Board—a body established by the Commonwealth Government itself—favoured the requests of the cotton growers and manufacturers. The decision of the Commonwealth Government also is a direct repudiation of its undertaking that immediately the Tariff Board reported on this question, the necessary action would be taken. Briefly stated, the position is that three years ago the Commonwealth Government embarked on a policy of protecting this industry. On that occasion the Tariff Board took exhaustive evidence and presented a lengthy report of the economic ramifications of the industry and made certain recommendations, some of which were given effect to by the then Government. It has since been found that the action of the Commonwealth has not been adequate to achieve the policy enunciated by the late Mr. H. E. Pratten, who intimated at the time that millions of pounds of capital would be available for the establishment of the cotton manufacturing industry in Australia. "We have to-day the startling anomaly that whilst cotton in unlimited quantities can be produced in Queensland, cotton goods to the equivalent of from £12,000,000 to £15,000,000 sterling are imported annually into the Commonwealth, a very large proportion of which, quite reasonably, could be produced and manufactured here and provide employment for large numbers of Australian citizens," added Mr. Smith.

Tariff Anomalies.

Continuing, the Minister said that it had been shown beyond question that the weakness in the existing position lay in the inadequacy of the protection against imported cotton yarn. Imported cotton yarn equivalent to 20,000 bales of lint was being imported annually into Australia from Britain, U.S.A., and Japan. It was a lamentable reflection upon the inefficiency of the existing tariff arrangements to realise that during the past financial year close upon 8,000 bales of cotton had to be exported, whilst yarn to the equivalent of 20,000 bales had been imported. A complete case for the correction of these anomalies was submitted by the Cotton Board and the cotton spinners combined to the late Minister for Trade and Customs, and the Tariff Board and Mr. Gullett and his colleagues in the Federal Government have this information at their disposal.

Cotton Growing needs Protection.

Cotton growing in Australia was a comparatively young industry, and as such requires encouragement and protection at least equal to that given to other industries. A large proportion of the cotton products that are now imported could be produced in the Commonwealth. The soil, climatic and environmental conditions prevailing in many parts of Queensland are suitable for the growing of cotton, and if this industry is fostered to the degree that it is deserving of, an additional primary and secondary industry can be readily established.

Stability is the life blood of any industry and no industry can progress unless it is established on a sound foundation. Both the growers and spinners of cotton have been left suspended in mid-air without any definite knowledge concerning the future prospects of the industry. Under such conditions progress is impossible.

A Detrimental Delay.

The Federal Government has failed to appreciate the fact that the cotton growers must have a knowledge of the position, and be able to estimate with some degree of accuracy the figure their cotton will realise before the cultivation of the land and planting of the crop is proceeded with. It is necessary also that the cotton spinners should have early intimation as to the area planted under cotton and the prospective tonnage of cotton that will be harvested, so that they can satisfactorily arrange their purchases of ginned cotton. The delay in the announcement of the fiscal policy of the Government in connection with any primary industry is detrimental.

A Serious Risk to the Industry.

Mr. Gullett (Minister for Trade and Customs) would now have us believe that economic issues which arise out of such a policy have only now been brought under the Commonwealth Government's notice. This is a misrepresentation of fact. The truth is that the original Tariff Board report of three years ago examined those aspects of the matter. With them the late Mr. Pratten and his colleagues in the present Commonwealth Government were intimately familiar. Mr. Gullett also says that to do what the cotton growers and manufacturers have asked would increase the cost of clothing to the workers. If he has read the Tariff Board's report he must know that this is not the case. In the evidence submitted to the Tariff Board the spinners have guaranteed that prices would not be increased, and a schedule was also submitted showing the prices which would rule in relation to world cotton values. Mr. Gullett's argument that to do the right thing by the industry would mean that a new charge would be added to the cost of living is, therefore, a specious plea for which there appears to be little justification. He further states that a duty of 50 to 60 per cent. would be necessary. He must know that the manufacturers did not ask for such a duty, that which they sought being 35 per cent. preferential, 48 per cent. intermediate, and 55 per cent. general. He further argues that cotton growers are not specialist farmers as they also engage in other branches of agriculture. This is just where the danger lies of serious damage being done to the primary industry, as a result of continued inaction. There are large tracts of territory in Central Queensland peculiarly adapted to cotton growing, and in those districts there are a large number of farmers who confine themselves to cotton. If, as a result of continued disappointment in the attitude of the Commonwealth Government, these men take up dairying they will never come back into cotton to anything like the same extent which at present is the case.

No Tangible Security for the Cotton Grower under Existing Tariff.

The fact is that the areas of cotton planted were sown on the faith of the assurance which was given that the matter of the additional protection required for the manufacturers would be dealt with early in the parliamentary session just closed. That assurance has not been honoured, and it has been substituted for the assurance contained in Mr. Gullett's announcement to the effect that "a further statement upon the whole subject will be made early next session." The position, therefore, is that last year the cotton growers and manufacturers had an assurance that the matter would be definitely dealt with in the session just closed. This has now been transposed to an assurance of "a statement next session." This is not very tangible security upon which to plant extended acreages of cotton. The current season's estimated production of 6,000 bales could have been 40,000; in other words, £1,000,000 per annum of new wealth could have been created which is not in existence because of the doubt of the growers as to their market.

In conclusion, the Minister said that the Commonwealth Government is clearly guilty of failure to honour its obligations and to fulfill the assurances which were given by it and accepted in good faith by both growers and manufacturers. Apparently its assurances are worth nothing, and it is lamentable that Australian industries must stagnate as a result of the Commonwealth Government's failure to grant a perfectly reasonable and logical request. Meantime, the existing ridiculous state of affairs will apparently continue under which our cotton growers send their cotton overseas to find a market whilst the same ships bring back the manufactured article, and because of this many Australian citizens are unemployed.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription—one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

PASSION FRUIT CULTURE.

By ALBERT H. BENSON, M.R.A.C.

No recent publication dealing with the culture of this fruit having been issued by this Department, it is considered desirable to bring out a new pamphlet* dealing not only with the well-known passion fruit *Passiflora edulis*, but with the less known fruits, varieties of the same natural order "Passifloræ," that can be grown here, such as the Grandailla, *P. quadrangularis*; the "Bell Apple," *P. laurifolia*; the Mexican Passion Fruit, *P. ligularis*; and the Banana Passion Fruit, *Tacsonia mollissima*. Other varieties of the same natural order are grown for the sake of their flowers and foliage, and the papaw, "*Carica papaya*," is a very near relative.

All passion fruits are climbers, and the varieties above referred to are either semi-tropical or tropical, and require a well-drained, friable, rich sandy loam soil to be grown to the best advantage; but the common passion fruit can be grown on comparatively poor soils that are naturally well drained, provided they are systematically manured, well cultivated, and are not subject to severe frosts. Stagnant water at the roots is fatal and very heavy soils should not be selected.

As with all other fruits the land should be thoroughly prepared prior to planting, so as to reduce it to a state of perfect tilth, and provide the right soil conditions in which to start the young plants. This is a matter of very great importance, and one that does not receive the attention it should, as not only passion fruit but all other fruits are frequently planted in land that is very far from being in good order, and which should have received much more care and attention in order to enable it to produce healthy vigorous plants that will yield payable returns. Slovenly work is never a success in any branch of fruit culture; and nothing is "good enough" except the best; in fact, as far as the fruit itself is concerned, the only fruit in which there is any profit is "the best."

Passiflora edulis—Purple Passion Fruit.

This variety is the one that is most commonly grown, not only in Queensland, but throughout Australia. There are at least two types, the large fruited or "giant" passion fruit, sometimes called "Mexican," which attains a size of over 2 inches in diameter, and the common type which averages about 1½ inches in diameter. The former, though a larger and more showy fruit, is somewhat disappointing, as it is frequently a shy bearer and the fruit does not contain as large a percentage of pulp as the common type, which is the best all-round commercial fruit. The best fruit has a very dark purple skin, which is filled with an orange-coloured pulp in which the seeds are imbedded. The pulp is slightly sub-acid and possesses a very distinctive agreeable flavour, so that when used as an ingredient of a fruit salad it imparts its characteristic flavour to it, and the salad is greatly improved thereby.

The plant is easily propagated from seed, all that is necessary being to select perfect fruit, fully mature, from a perfectly healthy plant that is free from leaf, root, vine, or fruit affection of any kind. The pulp, when removed from the fruit, should be placed in a tub or suitable vessel, and be covered with water, the mass being then allowed to ferment long enough to free the seeds from the pulp, when they should be strained off, well washed, and dried. If early spring ripened fruit is selected and the seed is planted as soon as ready, good strong plants will be available for summer planting, but if plants are wanted for early spring planting the seed must be sown the previous autumn. The seed should be sown in a specially prepared seed bed in soil of a light, free nature, containing a quantity of leaf mould or humus—a good potting soil—and the young plants should be sheltered from the sun and judiciously watered should the soil become dry. When the seedlings are about 1 foot high or larger they should be planted out in the permanent position, taking care to keep them moist so that they will not dry out.

Prior to planting, the land is marked off in rows not less than 10 feet apart. A trellis consisting of good fencing posts, placed 15 feet apart in the row, is erected along the row, the posts being set with their width across, not in the direction of the row. The posts should be about 8 inches wide by 3 inches thick by 6 feet 6 inches long, and be set 18 inches in the ground and 5 feet out of the ground. The end posts must be much heavier and be well strutted as they have to act as strainers, and prevent the wires that are attached to the top of the posts from sagging when they have to carry a heavy growth of vines. Two No. 8 galvanised wires are firmly fixed to the top of the posts, one on each side, so that when in

* These notes were published originally in the "Q.A.J." for March, 1926, and are reprinted in response to numerous requests.—Ed.

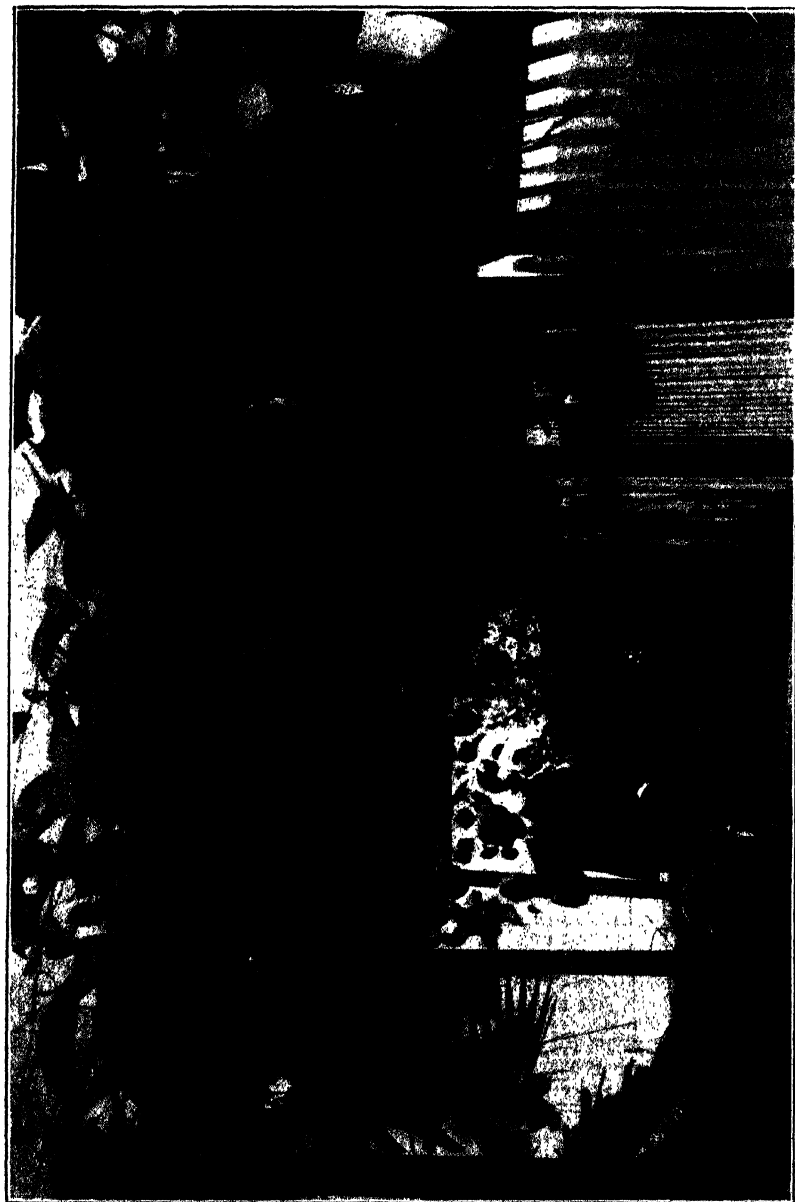


PLATE 88.—THE LARGE-FRUITED GRANADILLA.

Carrying specimens 9 in. x 17 in. circumference, grown by Mr. J. C. Brünich, in his garden at Stanley Terrace, Taringa, near Brisbane.

position they form two parallel lines, 8 inches apart, on which the vines are trained. The young plants are planted midway between the posts, right under the wires, and are tied to a light stick or other temporary support till they reach the height of the wires, when they are topped and two main lateral stems are allowed to develop, all other lateral growths on the main stem from the ground to the wire being removed. The two main laterals are then trained on to the wires, and when they meet those of the adjacent plants their growth is stopped by pinching back the terminal growth, which causes secondary laterals on which fruit is borne to be thrown out all along the main lateral. These secondary laterals, if left alone, throw out further laterals and these again in turn make more lateral growth, with the result that a very dense and tangled growth of vines is produced from which it is hard to separate the primary and secondary laterals and which, owing to its dense habit of growth, is frequently prone to be attacked by disease. Systematic pruning is therefore desirable—first to keep the plants healthy, secondly to produce strong new lateral growth on which good fruit will be grown, and thirdly to bring in the crop at different periods of the year, so as to get a better distribution of the crop instead of a glut at one time and a scarcity at another. When an autumn or winter crop is desired the main summer crop must be sacrificed. This is done by pruning the vines right back to the secondary laterals when they are showing their blossoms for the summer crop, and this will have the effect of throwing out a new growth which will blossom at a later period. A word of warning is, however, necessary; don't prune hard back in dry weather—you will probably kill the plants if you do so—but wait till the ground has had a good soaking, when the plants will throw out a fresh growth very quickly and will not be permanently injured. A good dressing of quick-acting manure at this time will be found beneficial and materially increase the following crop.

Mr. Brünnich, in his last edition of "Complete Fertilisers for Farm and Orchards," recommends the following manure for passion fruit:—

"Use per acre, in accordance with the richness of the soil, a mixture of—1 to 2 cwt., nitrate of soda; 4 to 8 cwt., blood and bone manure; 1 to 2 cwt., superphosphate; 1 to 2 cwt., sulphate of potash. A top dressing of 1 cwt. of nitrate of soda in spring will be found beneficial."

This is a complete manure rich in organic and inorganic nitrogen, citrate and water soluble phosphoric acid as well as potash, and should not only act quickly but be fairly lasting in its effect.

The passion fruit is liable to be attacked by several different pests of which the leaf disease is by far the most serious. This disease has only made its presence felt during recent years, and so far no remedial measures have been found very efficacious. The disease is of an obscure nature and attacks every part of the plant above ground—the flowers, leaves, and laterals. The latter are killed by a small portion of the stem becoming affected to such an extent that it dies and all the rest of the lateral that is beyond the part attacked shrivels and dies, frequently when it is covered with fully grown but immature fruit which shrivels up. The affection has received the careful attention of the Vegetable Pathologist, and that the result of his investigation has proved it to a new fungus controllable by Bordeaux Mixture. Red spiders and spinning mites frequently injure the leaves and young laterals. These pests can be kept in check by spraying with sulphide washes or dusting with finely-ground sulphur.

Scale insects of various kinds also attack the wood, leaves, and fruit. These may be kept in check by systematic spraying, but this can only be effectual when the vines are systematically pruned, as when grown in a dense mass the spraying material used has little chance to come in contact with the majority of the insects.

Nematodes injure the roots, and here the use of materials that can be worked under the soil such as cyano-gas are well worth taking. Fruit fly also attacks the fruit, as does also a sucking bug. The latter sometimes causes a heavy loss, as the punctured fruit either drops or if it remains on the vine becomes hard and woody. This bug is very fond of the red prickly cucumber, commonly known as the "Cape or African Cucumber," and if this is used as a trap, a large number of the bugs can be caught and destroyed.

When fruit fly is troublesome, trapping with Harvey's (B) fruit fly lure as soon as the first sign of the fly's presence is seen and systematically attending to the traps will result in the destruction of large numbers of female flies, and thus reduce the loss they would cause were they allowed to lay their eggs in the immature fruit whilst the skin is still soft and before it becomes so hard that the fly cannot pierce it. As showing the attractiveness of the (B) lure the writer has recently caught no less than 1,200 Queensland Fruit Flies (*C. tryoni*) in one glass trap in five weeks,



PLATE 80.—PASSION FRUIT, REDLAND BAY, SHOWING METHOD OF TRELLISING AND PART OF A VINE IN FRUIT

of which nearly 80 per cent. were females, many being full of matured eggs ready to be deposited; so that systematic trapping with an effectual lure will undoubtedly tend to reduce the loss caused by this very destructive insect.

***Passiflora quadrangularis*—Granadilla.**

The granadilla is a tropical fruit that is better suited to the northern than to the southern part of this State, though excellent examples of the larger type of granadilla—“*Macrocarpa*”—can be produced in the coastal districts both to the south and north of Brisbane, provided the situation is a warm one, free from frost and well protected. The *macrocarpa*, as its name signifies, is a very large type of granadilla, the fruit frequently weighing several pounds. The seed cavity is small for the size of the fruit, and is surrounded by a thick layer of whitish flesh which has no distinctive flavour, but which, when flavoured with lemon or other suitable flavouring, is used for pies. It is not as a rule a heavy bearer, and must be grown on a horizontal (not lateral) trellis.

The Northern Granadilla—*quadrangularis*—is a smaller fruit of a somewhat irregular, oblong shape, about 4 to 4½ inches in diameter. The pulp cavity is large and is filled with large seeds surrounded with a pale yellow pulp of exceptionally high flavour when the fruit is fully ripe, which is known by the outer fleshy covering becoming soft, and the skin, instead of being a pale green, turns a dull yellowish-green colour. This variety when fully ripe is one of the highest flavoured tropical fruits, and eaten either alone or used in combination with the papaw, pineapple, banana, and the juice of a lemon or lime to form a fruit salad, it is very hard to beat. Unfortunately, it does not carry well and consequently can only be obtained in perfect condition where grown. The granadilla requires a deep, well-drained, rich loamy soil to be grown to perfection, and it does best when trained on an overhead trellis (as shown in illustration herewith, which was taken recently at Taringa, near Brisbane, and gives a good idea of its habit of growth). Similar manuring to that recommended in the case of the common passion fruit will be found beneficial.

***Passiflora laurifolia*, “Bell Apple.”**

The Bell Apple is not grown to any extent in this State though its fruit is quite equal to that of the previously mentioned varieties. It is a handsome and vigorous climber, and is more valuable for covering unsightly edifices or for ornamental purposes than for fruit production, and its cultivation for the latter purpose is not recommended. Without hand fertilising it carries but few fruit.

***Passiflora ligularis*, Mexican Passion Fruit**

May be eliminated from the list. The pulp is flavourless beyond a trace of sugar.

***Tacsonia mollissima*, the Banana-shaped Passion Fruit.**

Although this fruit has been seen in fruit shops of the Southern States for some years, it is only recently that it has been met with in our local markets. Some time ago a quantity of fruit was offered for sale locally, and met with a good demand at a very satisfactory price. It is not, however, advisable at the present time to plant this variety extensively, despite the attractive appearance of the fruit, as a taste for it will have to be acquired and a demand created before there will be a market for any large quantity of the fruit. Its culture is similar to that of other passion fruits and it is hardier than the more tropical varieties.

If you like this issue of the Journal, kindly bring it under the notice of a neighbour who is not already a subscriber. To the man on the land it is free. All that he is asked to do is to complete the Order Form on another page and send it to the Under Secretary, Department of Agriculture and Stock, together with a shilling postal note, or its value in postage stamps, to cover postage for twelve months.

THE CHESTER WHITE BREED OF PIG.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

With a view to testing their suitability for climatic conditions and their adaptability to Queensland market requirements, some breeders—Messrs. Brown Bros. of Mooroombin, Toogoolawah, and Percy V. Campbell of Lawn Hill, Lamington—have purchased a pair each of Chester White boars and unrelated in-pig sows. These pigs were in company with a consignment of Duroc-Jersey pigs shipped at Vancouver, B.C., early in January, 1929, and after a protracted voyage were delivered at Sydney on 23rd February.* After a period in quarantine at Sydney, they were delivered at Brisbane on 16th March, after nearly two and a-half months on an ocean journey. The pigs arrived in good order and condition and are considered to be typical representatives of their breed.

Historical Note.

As with several other American breeds with which breeders here have had experience, the Chester White originated in Chester County, Pennsylvania, U.S.A., and have for many years enjoyed a widespread popularity in the United States and Canada, where they are looked upon as a useful farm type, especially suited for cross-breeding purposes for the production of a popular type of butcher and bacon hog.

The record of the Chester White, according to the well-known authority, Mr. H. C. Dawson, is somewhat enmeshed in historical uncertainties, but it is known that the old Bedfordshire breed was being handled in that region at the time the first Chester Whites appeared on the scene. Those were the days when farmers did not spend much time indoors and when fountain pens, typewriters, and dictaphones were scarcely even thought of, and when herd book societies, especially organised for the purpose of recording pedigrees and fostering the interests of pig producers, were but in the making. In the year 1818 Captain James Jeffries imported white pigs from Lincolnshire, England (these were evidently of the Lincoln curly coated type), and at about the same time English and Chinese hogs were imported from England. Both were generally white in colour (the Lincolnshire pig curly in the coat), but both had black or blue spots over the body. These spots have since been largely eliminated from all the white breeds, though all show a tendency to occasionally throw progeny with odd black and blue smudges on the body.

There were also white hogs in Pennsylvania previous to these importations, but they, like many pigs of their time, were of a slow-growing, late-maturing type. As with the early development of Poland-Chinas and Duroc-Jerseys, breeders interested in the white pig used blood from the various white breeds available, and from the progeny of these, by careful selection and judicious handling, they developed a type permanently white in colour and free from the undesirable dark coloured markings.

In America, as in England, the white pigs soon gained favour, especially in the country surrounding the city of Pennsylvania and in the pig-raising areas of Ohio. Of the progeny of these early strains some were of an extremely large, coarse, slow-maturing type, while others were of lighter build and were more compact, and grew rapidly. Some of this blood was used in moulding the Poland-China, and doubtless also white pigs were originally used with red stock in the production of the Duroc-Jersey.

Among early breeders of the Chester White type may be mentioned the Todds, of Ohio, progressive farmers who originated the type known as Todd's Improved Chester between 1860 and 1870, and which eventually came to be known as the Improved Chester White. L. B. Silver, also of Ohio, developed another type from stock which he bred from Todd's strains, his requirements being more along the lines of light, quick-growing pork pigs. He was so successful that Silver's pigs finally became known and registered in the herd book in 1884 as the O.I.C. breed (Ohio Improved Chester).

Thus the Chester White is one of the oldest of the pure American breeds, and for thirty years or more they have been regarded as the butcher's model, though Queenslanders must remember that the most popular pork pig in America is of much heavier build and carries much more weight than our porkers here. Many American authorities classify the Chester White as one of the lard breeds—that is, the pig intended more for the production of fat than of flesh—but possibly climatic conditions and environment in Australia may alter this fat-producing tendency. Some authors say the pigs are not active, though they possess good capacity for development and are good feeders. The specimens we have are certainly long-bodied, growthy types, but there is a variation in the nature of the coat, one strain having fine straight hair and another a longer coat with a tendency to curl.

* Included in this shipment also were Duroc-Jersey pigs for Mr. Leo Delroy, of Murgon, and Mr. W. Koehler, of Yamsion, via Dalby.

In the development of the pigs that came to be known as the Improved Chester White, and which were developed by the Todd Brothers in 1830, pigs from New England, Delaware, and other counties were used. Some of these were known as Irish Grazers, others as Norfolk Thin Rhinds, and still others as Bedfords. In 1835, Joseph Haskin, a Massachusetts breeder, came to live in Ohio and brought with him stock known as the Byfield breed and the Thin Rhind strain, and it is but natural to presume (as is done in Australia), when there are a few breeders of any one particular type, and where unrelated strains are limited, a good deal of interbreeding goes on, and one borrows or buys from another and keeps only the best of the stock produced as foundation stock.

Later records show that another local breed of pig also had a part in the early make-up of the Chester White, the latter breed being introduced by one Joel Meade, of Norwalk, Ohio. His pigs were noted for their ability as grazers, and suited admirably the open-air system of pig-raising popular even in these days.

In 1862 a strain known as the Normandy hog (probably of French origin) appears to have been utilised in building up the improved type of Chester White. Thomas Wood, of Pennsylvania, was also interested in this breed, and shared many of the honours with the Todd brothers at the country stock shows for which America has been famous for generations.

Breed Characteristics.

It is apparent from a close study of all these records that there is no distinct relationship between the Poland-China, Duroc-Jersey, or Chester White pigs, though they are all of similar type and all have the small lopped ears characteristic of the American types. At the same time they were all bred and developed under similar environment, the colour having been distinctly a matter of fancy, and having been developed by the introduction of strains carrying the largest proportion of the most desirable colour; thus the fanciers of the Duroc-Jersey specially selected breeding stock of a cherry-red colour, the Poland-China enthusiasts stuck to the black and white, while the Chester White fanciers developed a pig wholly white in colour without reversion to the older multi-coloured hogs.

Weight.—In those days hogs of 1,000 lb. in weight were the special fancy of many breeders, and the use of large coarse hogs, so undesirable now, was forced on many breeders, even against their will.

Colour.—The hair of the Chester White pig in its several forms in America still shows a tendency to coarseness, and curly-coated pigs are not uncommon. Some of the original strains had a distinct tendency to sunburn and sunscald, and, of course, had to be eliminated. Some of the original Thin Rhind breeds—black spotted with white, or white belted with black—had this fault, and it has only been by careful selection over many years that this fault has been bred out of the white, black and white, and belted breeds (the Hampshires).

Prolificacy.—All records show the Chester White to be a prolific and hardy breed, and many breeders are of opinion that the sows of this breed are even better endowed with maternal instincts than the sows of the other breeds to which reference has been made.

Early Maturity.—One writer, in referring to their early maturing tendencies, says that it has been estimated that the Chester White will show an average gain under good conditions of 1 lb. in weight for every 3 lb. of feed given.

Standard Points.

The head of the Chester White shows a straight face, somewhat like that seen in the Poland-China, but slightly more dished. The nose has a tendency to be rather long and narrow. The ears are large, coarse, and droop forward in a manner similar to the Poland-China, but the droop or break is usually further from the tip; as a rule, too, the ear is somewhat heavier, and it is quite common for it to be loosely attached. The eyes are large, bright, and usually wide-set. It is undesirable that they should be surrounded by ridges of fat or puffy flesh, as this may affect the sight. The neck, jaw, and shoulders are full, well fleshed, and in the most approved types merge gracefully with the neck and body, the latter being long and of good depth. The chest of necessity needs to be wide, long, and deep, allowing for free action of the heart and lungs. The long, deep body permits of free action of all the digestive organs and gives to the animal a very attractive appearance from the standpoint of the bacon curer. The breeding organs also require ample room to permit of the development of thrifty litters. For preference the back should be long, but slightly arched—the rainbow-backed, stilty-legged type, being quite undesirable from the Australian point of view. Strong loins connecting up with the body, whose ribs are long, flat, and well sprung, allow for the development of weight and flesh.

Whether there will be present in the Chester White pigs produced in Australia heavy, coarse-boned legs remains to be seen; the fault is mentioned, for some of the American strains show distinctly coarse bone. Some authors seem to indicate leg weakness as a result of coarse, soft bone, but probably this fault also will be overcome by strict attention to selection. It is likewise hoped the Chester White will carry a roomy, deep, and well-fleshed ham, for under our conditions pigs need long, deep bodies and particularly well-developed hind quarters in order to attract the buyer's attention and realise top prices.

It is doubtful if the Chester White will, in so far as development of ham is concerned, be able to give a lead to the Poland-China, for the latter breed invariably carry really good hams, but the Chesters appear to carry greater length, and this no doubt accounts for their prolificacy. The colour of new breeds is always a problem with judges, but the colour of the Chester White is whole white, no black hair being admissible, though it is common for a certain number of black and bluish spots to show on the skin. As already stated, the objective is to eliminate these; hence strains showing an absence of dark spots, and being otherwise of equal merit, would be given preference.

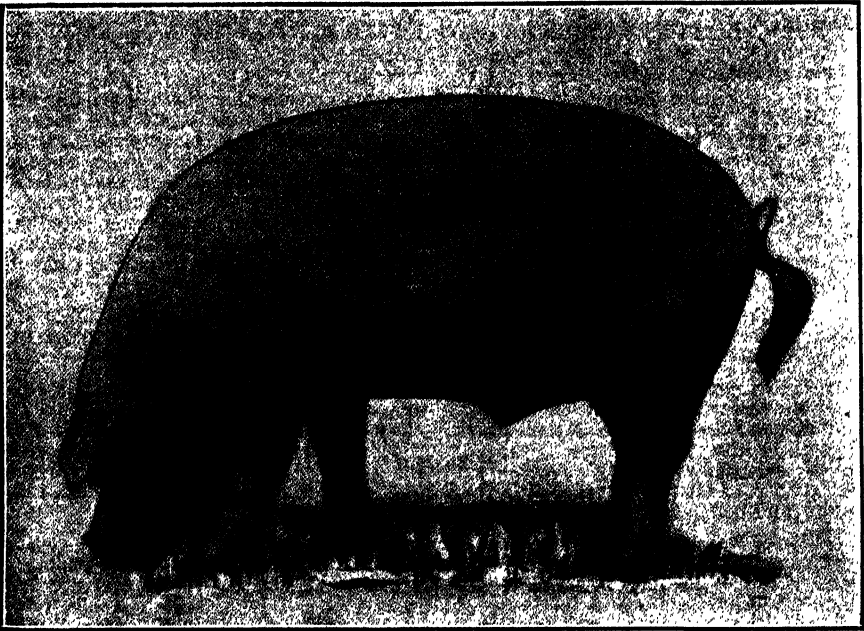


PLATE 90.—GRAND CHAMPION CHESTER WHITE, BARROW INTERNATIONAL LIVE STOCK SHOW, U.S.A., 1927. SHOWN BY ALBERT H. STUART, OF WHITEHALL, IOWA.

Points worthy of note: Type and body development, colour, and shape of ears. Note—It has been difficult securing a really good photograph of a Chester White with which to illustrate this article, but the above appears to represent a type popular in the United States where many of the pigs appear leggy and rainbow backed. In Queensland the long, level backed, deep sided and well developed hindquarterd pig is the most popular.

For cross-breeding purposes doubtless the Chester White will be found to give excellent results where used on types like the Berkshire, the Tamworth X Berkshire, and the Yorkshire. It is problematical whether they would cross well with the larger breeds like the Gloucester Old Spot or Large Black, or with the Tamworth, but possibly good results would be obtained by using sows of the Poland-China type with boars of the Chester White breed.

These are all points on which further details will be made available as time goes on. Details regarding the registration of these pigs and with regard to their standard of excellence may be obtained on application to the Secretary, Australian Stud Pig Breeders' Society (Queensland Branch), 3 Inns of Court, Adelaide street, Brisbane, or from the author of this article, from whom also other particulars may be obtained.

Answers to Correspondents.

Dairy Cattle Judging—Scale of Points.

A.L.D. (Bundaberg)—

The ratio scale of points adopted by the Queensland Jersey Cattle Society is as follows:—

| | Maximum Points. |
|---|--------------------|
| 1. Head—Fine; face dished, showing pure Jersey character; cheek fine; throat clean | 10 |
| 2. Nostrils—High and open; muzzle encircled by a light colour | 3 |
| 3. Horns—Small and incurving; eye full and placid | 4 |
| 4. Neck—Straight, thin and long, and lightly placed on shoulders | 3 |
| 5. Lung capacity as indicated by width and depth through body immediately behind the shoulders | 4 |
| 6. Barrel—Deep, broad, and long, denoting large capacity; ribs rounding in shape | 10 |
| 7. Back—Straight from withers to setting of tail; croup and setting on not coarse | 4 |
| 8. Withers—Fine and not coarse at point of shoulders | 2 |
| 9. Flips—Wide apart, rather prominent, and fine in the bone | 4 |
| 10. Hind Legs—Squarely placed when viewed from behind, and not to cross or sweep in walking | 2 |
| 11. Tail—Thin, reaching the hocks, good switch | 2 |
| 12. Udder—Large, of good flexible quality and not fleshy, quarters well divided | 10 |
| 13. Rear Udder—Well up, protruding behind and not rounding abruptly at the top | 10 |
| 14. Fore Udder—Full and running well forward | 7 |
| 15. Teats—Of good uniform length and size, wide apart, and squarely placed | 3 |
| 16. Milk Veins—Large, tortuous, and prominent | 4 |
| 17. Richness—As indicated by a yellow colour on horns, escutcheon, and inside of ears | 3 |
| 18. Skin—Thin, loose, and mellow | 2 |
| 19. Growth | 3 |
| 20. General Appearance—Denoting a high-class Jersey and economical dairy cow. Clipped or shaved animals not recommended | 5 |
| Registered Pedigree | 5 |
| Perfection | 100 |

A mature cow in good condition may run from 650 to 850 lb. live weight.

BOTANY.

Replies selected on account of their general interest from the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.

Wild Millet.

W.J.P. (Wetheron, Gayndah Line)—

Your specimen of grass is *Panicum colonum*, commonly known in Queensland as Wild Millet. It is a grass very widely spread over the warmer regions of the world in cultivation. It has considerable value as a fodder, and is generally looked upon as one of the parents of the well-known fodders Japanese millet and White Panicum. Seed is not obtainable through the ordinary commercial channels, but seeds of the fodders mentioned are of course obtainable, and these yield a much heavier amount of fodder than the wild form.

Cattle Bush—Sandlewood.

A.B.G. (Kowguran)—

- No. 1 is *Pittosporum phyllæoides*, commonly known as Cattle Bush. It is a small tree, with a very wide distribution in Southern Queensland, New South Wales, and South Australia, and is generally regarded as an excellent fodder tree.
- No. 2 is *Santalum lanceolatum*, a species of Sandalwood. I do not know that it is of any fodder value. This tree is rather interesting. It occurs in the north-west of Western Australia, in the Northern Territory, throughout most of Queensland, and in a good part of New South Wales. In the Kimberleys, the Northern Territory, and Northern Queensland, the tree produces a valuable sandalwood, largely exported to the East. In the most southern parts of the State, however, and in New South Wales, the wood loses all, or practically all scent, and is in consequence valueless, though the southern trees and northern trees seem much the same in the field.

Rattle Pod—*Phaseolus semi-erectus*.

E.F.D. (Bowen)—

- No. 1 is *Crotalaria striata*, a species of Rattle Pod. This plant has a wide distribution over the Tropics, and is cultivated in some countries as a green manure, particularly for tea. A bad feature of it, however, is that it is poisonous to stock, and a pamphlet on it in this respect has been posted to you.
- No. 2 is *Phaseolus semi-erectus*, a native of Tropical America, but now a naturalised weed in most tropical and subtropical countries. It was originally introduced into Queensland as a fodder, though as far as my experience goes, stock do not seem to care for it.

Mulga. Bendee. Desert Poison Bush.

E.M. (Hamilton Downs)—

1. *Mulga Acacia ænura*.—A well-known fodder of Western Queensland, and not known to be poisonous in any way.
2. *Bendee Acacia curvinervia* (broad leafed form) *Acacia* sp. (narrow leafed form).—These are not known to be poisonous.
3. *Gastrolobium grandiflorum*.—Very common in parts of Western and North Queensland, the Northern Territory, and the Kimberley district of Western Australia. It is variously known as Desert Poison Bush, Heart Leaf Poison Bush, and Wallflower Poison Bush. It is one of the worst poisonous plants we have and the poison does not disappear when the plant is cut and dried. At what stage the plant is most poisonous we are not in a position to say. The symptoms of poisoning are convulsions and usually blindness.

***Euphorbia prostrata*—*Euphorbia Drummondii*.**

INQUIRER (Winton)—

1. *Euphorbia prostrata*, a red or reddish weed lying flat on the ground, common about townships in Queensland. It is widely spread over the world, but is a comparatively recent introduction into Queensland. It is not known to be poisonous, though all *Euphorbias* should be looked upon, perhaps, with suspicion.
2. *Euphorbia Drummondii*, the Caustic Creeper. This plant is poisonous to sheep. It has been found to contain a prussic-acid yielding glucoside, and if eaten then in any quantity death soon follows. We have examined a fair number of Queensland samples of this plant, but have only found rather doubtful traces of the glucoside and, therefore, its formation I should say is comparatively rare. There is also evidently another poisonous principle that has not been extracted, as it causes symptoms very different from those caused by a prussic-acid yielding glucoside. The chief symptom is a considerable swelling in the head and neck. Experienced sheepmen say that if this swelling is pierced a clear, amber-coloured fluid runs out, and the life of the animal may be saved. The amount of weed necessary to cause these symptoms we cannot state. It probably varies according to the stage of growth of the plant.

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Nundah, Queensland.

The Stink Grass.

W.E. Co. (Toowoomba)—

The specimen is *Eragrostis major*, the Stink Grass, so-called from the peculiar odour the grass gives forth. It is an annual grass, a native of Southern Europe, now widely spread over practically all the temperate regions of the globe. It is palatable to stock only in its young stages. Later on it becomes coarse and does not seem to be touched. It has no importance as a fodder.

Pigeon Grass.

E.A.S. (Millaa Millaa)—

The specimen is *Setaria aurea*, commonly known as Pigeon Grass, on account of birds being rather fond of the grain. It is a grass that favours, as a general rule, rather wet, swampy situations, and in such has some value as a fodder. We should not think it likely to spread and prove a nuisance.

Western Plants Identified.

INQUIRER (Elderslie, Winton)—

1. *Amarantus Mitchellii*. An Amaranth. Not poisonous.
2. *Polanisia viscosa*, a small member of the Caper family. It is very abundant, but we have not heard a common name for it. It is not known to be poisonous in any way.
3. A plant of the Convolvulus family. We should say *Polymeria longifolia*, but the specimen is rather young to be sure. Plants of this family are very common in the general mixed pastures of Western Queensland, but are generally regarded as quite wholesome.
4. *Amarantus Mitchellii*. The same as No. 1.
5. *Trianthema decandra*. Hog Weed. It is not poisonous so far as known.
6. A plant of the Mallow family—Malvaceæ—but too young to determine specifically. Plants of the Mallow family are on the whole quite wholesome.
7. A plant of the Mallow family, too young for specific determination. Possibly the same as No. 6.
8. *Phyllanthus thesioides*. No common name. It is fairly frequent, and is not known to be poisonous or harmful in any way.
9. *Borrhaavia diffusa*. Tar Vine. It is not poisonous; in fact, it is generally regarded as a useful fodder.
10. *Trianthema decandra*. Hog Weed. Not poisonous so far as known. Very common. An older growth of No. 5.
11. *Marsilea Drummondii*. Nardoo. It is not poisonous.
12. *Corchorus hygrophilus*. No common name. It is not poisonous.
13. *Trianthema crystallinum*. No common name, but the plant is allied to the Pig Weeds. It is not poisonous.

We should regard none of the thirteen specimens as dangerous. All are more or less common weeds in Central-Western Queensland.

Native Sorghum.

W.T.P. (Moore, B.V. Line)—

Your specimen is a species of Sorghum, and we should say the native form of *Sorghum halepense*, commonly known as Native Sorghum. The Sorghums, however, are rather difficult to determine specifically in the absence of specimens from the basal part of the plant showing the root system. The Native Sorghum differs chiefly from Johnson Grass in that it is a perennial with small buds arising at the base of the plant. The Johnson Grass possesses long, white, underground runners or rhizomes. Sudan Grass is closely allied to both but differs in being an annual of finer growth. Like practically all the Sorghums a certain amount of danger is to be expected in feeding the plant. It is best to wilt the plant slightly before feeding, though cases of poisoning by it are not very numerous. The poisonous principle is a prussic acid-yielding glucoside.

Brown Top—Blue Grass.

W.B. (Chinchilla)—

1. *Pollinia fulva*, Brown Top. This grass has rather a mixed reputation. In New South Wales it is generally regarded as an excellent fodder plant, sweet and palatable to stock, but in Central Queensland it is very common and is generally looked upon as being coarse and innutritious. It seems to vary a good deal according to situation, and only local experience will tell you the value of the grass in your district.
2. *Andropogon intermedius*, a species of Blue Grass. It is a rather coarse grass, but provides fair amounts of leafy forage.

Yellow Grass (*Paspalum conjugatum*).

W.T. (Pomona)—

Your specimen is *Paspalum conjugatum*, known in North Queensland as Yellow Grass or Sour Grass. It has an evil reputation in the wetter, warmer parts of the Atherton Tableland, taking possession of pastures, and written down by farmers there as next to useless for dairying purposes. The grass is a tropical one and only seems to have made its appearance in South Queensland in the last couple of years. It is very common in New Guinea, mostly on the rubber plantations, and we have seen working mules there do fairly well on it.

Chinese Burr.

J.H. (Miriam Vale)—

Your specimen is *Triumfetta rhomboidea*, the Chinese Burr, a common plant in Northern and to a lesser extent in Central Queensland. It is a very obnoxious plant if it gets a foothold. It is spread by its burr like seed vessels which adhere to clothes, feet of animals, and similar means.

PIG RAISING.

*Replies selected from the outgoing mail of the Senior Instructor in Pig Raising,
Mr. E. J. Shelton.*

Skim Milk for Pigs.

A.G.H. (Rosewood)—

- * Skim milk may be successfully fed to pigs, either in a fresh state as it comes from the separator, or after it has curdled owing to acid formation.

On coming from the separator the skim milk should be allowed to stand for a short time, then the froth taken off, otherwise the pigs may get a stomach full of froth and this may cause colic.

Allowing the skim milk to stand for twelve hours or more in a barrel so that there is sufficient acid to curdle it is a good practice, provided the barrel is cleaned out thoroughly after each lot of milk has gone through it, but in practice we often find that the barrel used is in a filthy state and the milk in it, not only becomes sour and curdled but it becomes putrid owing to the growth of putrefactive organisms. So for safety, it may be better to feed skim milk after standing for about an hour after separating and before feeding to the pigs.

Skim milk alone is not a very good ration though it is a very valuable food for pigs. For best results it should be fed in conjunction with grain, green food and roots, or pumpkins and melons. To get the greatest feeding value from a given quantity of skim milk, it should be fed with grain in the proportion of 3 or 4 lb. of grain to 1 gallon of skim milk.

It is important in feeding slop foods to pigs that the troughs should be cleaned out regularly and not allowed to become filthy. A weekly wash out with a scrubbing brush and a bucket of disinfectant solution does a lot to keep the pig trough in a sanitary condition. Of course, disinfectant should not be left lying near or in the pig trough as it is poisonous to pigs.

Abscessed Ear.

W.Y. (Lagoon Pocket, Mary Valley)—

The trouble is due to accidental causes, and has probably been brought about by a bite from a dog or from another pig. The wound thus inflicted has not healed properly and has become pathogenic (disease-producing), and as a result pus formation has been set up, and this accumulation of pus enclosed under the thick skin of the ear has produced the abscess to which you refer.

We have observed the complaint more among breeds like the Large Black whose ears are large and pendulous than among breeds like the Berkshire or Tamworth whose ears are smaller and more erect in growth, although all stock are subject to abscesses. See pamphlet "Castration of Pigs" for references to other forms of abscesses productive of much pain and loss of condition.

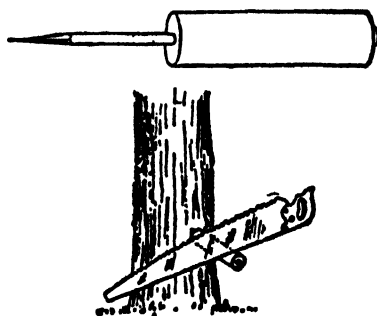
Treatment in cases of this description is best effected by lancing the abscess in some convenient spot so that the pus can drain away and let the wound be cleansed, a cut at least 1 in. long should be made, and when the pus has been forced out the wound should be syringed out with a strong disinfectant solution and then be plugged with cotton wool, and kept open by the daily renewal of washing and plugging. Smearing the wound with one of the ointments suggested in the castration pamphlet is also advised.

The trouble is not due to defective feeding or over feeding, but is due to permitting mature stock to run with the young stock and to feed together. Some sows and boars are very savage and snap and bite at other pigs, injuring them and causing disturbance in the sty.

SUPPORT FOR CROSS-CUT SAW.

The felling of trees by means of a one-man cross-cut saw is a very tiresome task, due to the difficulty of holding the saw at the proper angle while the cut is being started.

To overcome this in a very simple manner, one farmer has employed the roller support herewith shown.



A 12-inch length of $\frac{3}{4}$ -inch steel rod was sharpened at one end, and a wooden roller mounted upon same by shrinking a nut over the rod 3 inches from the pointed end, and threading a nut on at the blunt end.

Before starting the cut into the side of the tree, the point of the roller device is driven into it at a determined point. The saw may then rest upon the roller as it is drawn back and forth, making a clean cut at the desired angle without undue strain or exertion upon the part of the operator. A slight twist will remove the roller after the saw is removed.

POWER KEROSENE—ITS USE IN TRACTORS.

The tractor farmer looks at his fuel from a somewhat different viewpoint to the motorist. His first consideration should be work done per unit volume of fuel. He is using his tractor in the production of income, therefore a fuel that will enable him to cover a greater acreage with his various farm implements is the one to which he would naturally wish to give preference.

Some power kerosenes are excessively volatile, and while they may give slightly quicker switch over from motor spirit, they show a high consumption, and are prone to detonation when the engine is heavily loaded or carbonised. It is generally recognised that it is impossible to exaggerate one characteristic in a fuel without sacrificing others which may be even more important. Extreme volatility is invariably accompanied by heavier consumption, and is therefore to be avoided. Of far greater importance than mere ease of starting is the production of the highest degree of working power under continuous conditions of running.

In Australia, "Cross" kerosene has come to be looked upon as the standard fuel for tractors and spark ignition kerosene engines. While allowing a sufficiently quick switch over from motor spirit, it will idle readily and pick up without spluttering or hesitation and consequent loss of power.

Best Operating Temperature.

An important point which is so often overlooked is the fact that a tractor should not only be thoroughly warmed up before changing over to kerosene, but should be operated throughout at a comparatively high temperature. Competent authorities have definitely laid it down that the most efficient working is obtained when the water in the radiator is at a temperature of 175 to 180 deg. Fahr., or even slightly more. This enables complete vaporisation of the fuel, allowing it to produce its power to the utmost limit.

Undoubtedly the chief consideration is the area of ground which can be worked per gallon. The attainment of this object is influenced by the relative volume of heat units per gallon of kerosene, and this is found to be highest in "Cross." Naturally, when these extra heat units are converted into tractive power, a correspondingly greater amount of work is obtained per gallon. This should not be overlooked, as it amounts to an appreciable saving on the year's working.

The ability of a fuel to function under heavy loads without "knocking" or "pinking," as it is variously called, is also a consideration of no little importance. The tendency to "pink" is inevitably accompanied by loss of power, which in turn increases the amount of fuel used. There is, as well, heavier wear and tear on the engine parts from this cause.

Effect on Lubricating Oil.

As every tractor owner knows, a certain amount of dilution of the oil in the crankcase is inevitable. While efforts to make tractor lubricating oils better able to resist crankcase dilution have lessened the evil, prevention is better than cure, and the use of a kerosene which is proved to have the least tendency to dilute the oil is highly desirable. Here again "Cross" has established itself in general favour, and working tests have substantiated the claim made for it that its tendency to dilute the crankcase oil is at a minimum.

To sum up: firstly, see that the engine is kept hot. If necessary, the radiator shutter should be kept closed for this purpose; secondly, use a fuel that will enable the most work to be done—that is to say, a kerosene which possesses the greatest number of heat units per gallon. With these conditions fulfilled, an appreciable saving will result in the amount of fuel used per acre.

During the last year or two, when the consumption of kerosene for power purposes on Australian farms has expanded very rapidly, the system of supplying country centres in "bulk" has been successfully developed, and "Cross" kerosene is not now seen in many districts in the well-known cases and tins as formerly. The 40-gallon drum is gradually ousting the more expensive tins and cases; but, judging by its almost universal use, "Cross" continues to hold pride of place in most farming communities in Australia.

General Notes.

Grade Standards for Fruit.

Grade standards have been issued under the Fruit and Vegetables Acts for cavendish bananas, oranges and mandarins. The grade standards for cavendish bananas are the same as those previously issued with the addition that there is now included a grade called "special," which means sound fruit, free from blemish, and having a minimum length of 9 inches and a minimum circumference of 5 inches. Further, in the "choice" and "standard" varieties, a variation of a quarter of an inch in the minimum circumference will be allowed. The grade standards for oranges and mandarins practically remain the same, with the exception that mandarins 2 inches in diameter will be allowed.

Staff Changes and Appointments.

Acting Sergeant L. Jorgensen, of Windorah, has been appointed Inspector of Brands as from 2nd March, 1929; and Constable H. Sternberg, of Monto, has been appointed Inspector of Slaughter-houses as from that date.

Messrs. J. P. Jackson and W. Onton, of Mary's Creek, via Gympie, have been appointed Honorary Inspectors under the Diseases in Plants Acts.

The Inspector of Stock at Bowen has been appointed Government Representative on the Bowen Dingo Board, vice the Police Magistrate, Bowen, relieved of the duties.

Mr. W. D. Lewis has been seconded for duty as Temporary Inspector under the Diseases in Plants Acts until 30th June, 1929.

Messrs. J. Beck, Stanwell; H. R. Brake, Wowan; G. H. Bradley, Argoon; J. Bryant, Chowey; D. C. Pryce, Toogoolawah; F. A. Kajewski, Ma Ma Creek; and L. R. Macgregor, Director of Marketing, have been appointed members of the Cotton Board as from 19th February, 1929, to the 31st December, 1931.

The Inspector of Stock at Winton has been appointed Government representative on the Gregory Dingo Board, and Messrs. G. Morgan Reade, W. C. Quartermaine, G. A. Patterson, and R. J. Edwards have been elected members of that board.

The resignation of Mr. F. W. Haynes, Inspector, Agricultural Bank, Dalby, has been accepted as from 28th February, 1929, as tendered.

The resignation of Mr. G. A. Currie, Assistant Entomologist, Cotton Section, has been accepted as from 10th March, 1929, as tendered.

The Tully Cane Pest Board has been constituted as follows:—Millowners' representatives: Messrs. G. R. Blair and J. J. Cran; canegrowers' representatives: Messrs. J. D. Irving, W. Moran, and A. J. Winter. And the South Johnstone Cane Pest Board has been constituted as follows:—Millowners' representatives: Messrs. F. Gillan and C. J. Magee; canegrowers' representatives: Messrs. M. J. McNamee, C. E. Myers, and D. V. Woods.

Constable W. T. Barelay, of Turn-off Lagoons, has been also appointed Inspector of Slaughter-houses.

Mr. H. F. Damm, of Goomborian, via Gympie, has been appointed Honorary Inspector under and for the purposes of the Diseases in Plants Acts.

The members—millowners' representatives, canegrowers' representatives, and chairmen—of the various Local Sugar Cane Prices Boards throughout Queensland have been appointed for the forthcoming sugar season.

The following appointments have been made in the Agricultural Bank, Brisbane:—Mr. T. R. Quinn, Sub-Accountant, to be Senior Clerk, Accounts; Mr. J. McL. Hendy, Clerk, to be Clerk, Securities; Mr. J. R. Laherty, Clerk, to be Clerk, Possessions; and Mr. V. G. Dunne, Clerk, to be Clerk, Correspondence.

Mr. M. Flanagan, Inspector of Slaughter-houses, Bundaberg, has been appointed Inspector of Stock.

Mr. J. P. Ward, Clerk, Agricultural Bank, has been appointed Acting Inspector, Agricultural Bank, for a period of six months.

Mr. F. W. Schafer, C.P.S., Port Douglas, has been appointed Chairman of the Mossman Local Sugar Cane Prices Board, vice Mr. T. R. Beck, transferred.

Open Season for Goose and Duck in North Queensland.

The open season for goose and duck in North Queensland has been altered. The season will now be open on the 1st June and will close on the 31st October in each year.

Open Season for Ducks.

An Order in Council has been approved under the Animals and Birds Acts, declaring that the season for ducks in Southern Queensland will open on the 6th May, 1929, instead of the 1st April as in the preceding year. This open season will extend to 31st August, 1929.

Custard Apple Levy.

The custard apple levy regulations made under and for the purposes of the Fruit Marketing Organisation Acts in 1927 have again been extended to all custard apples marketed for the period from 1st March, 1929, to 28th February, 1930. This levy is at the rate of one half-penny per half-bushel case of custard apples marketed.

Introduction of Seed Wheat into Queensland.

By Proclamation under the Diseases in Plants Acts it has been declared that the introduction into Queensland of plants or portions of plants of all and every variety of wheat intended for seed purposes is not permitted unless a permit in writing shall have been first issued in respect thereof by an inspector.

Examination of Brands.

Regulations have been approved under the Diseases in Stock and Brands Acts, providing that an inspector may, for the purpose of identifying stock, clip or cause to be clipped or otherwise remove the hair from portions of any stock for the purpose of examining the brands upon such stock or for the purpose of ascertaining if there are any brands thereon.

Honey Board.

By Order in Council under the Primary Producers' Organisation and Marketing Acts, a Honey Board has been constituted for a period of five years to control honey and beeswax produced in Queensland by persons owning not less than five hives of bees in movable frames. The board to control the commodities will consist of four annually elected representatives of growers and the Director of Marketing.

The New Statesmanship.

"At present there is too much praise given to the safe men who, with a timidity which is often falsely called caution, cling to the old ways. The problems of human society demand a new type of statesmanship altogether, with the courage and integrity of the scientists in it, and unless the world comes under such leadership man may master the skies, but he will miserably fail to prove himself master of the earth."—Dr. Sidney Berry, in the "Yorkshire Observer."

Buffalo Fly.

In view of the danger to be apprehended from an extension of the buffalo fly pest, an Order in Council has been issued declaring a special area as a protective measure to regulate the movement of cattle from and within the present infested or suspected areas in the extreme north-western portion of the State. Action has already been taken by the Government to close Westmoreland crossing place against the entry of stock from the Northern Territory into Queensland.

Egg Board Referendum.

The question "Are you in favour of or against the extension of the duration of the Egg Board until the 31st day of December, 1931?" was submitted to 3,600 poultry growers owing fifty fowls and over who supplied their eggs to the Egg Board or its authorised agents has been decided. The result of the voting was:—

| | |
|-------------------------|------------|
| For the continuance | 998 votes. |
| Against the continuance | 417 votes. |

Mr. Arthur Jones, of the Department of Agriculture and Stock, was the returning officer.

Winter Roses.

"It has been observed that often the people who have the hardest life are the most cheerful. Patients in hospital, experiencing great pain; men and women, surrounded by all sorts of troubles at home and in their work; old people who have to be very careful of their health and their savings, and often haunted by some nameless fear—these are the people who are often most brave and very happy. What is the secret of it? There is no winter in a warm heart. There are roses in winter as well as summer."—The Rev. J. T. Hodgson, in the "North-Eastern Daily Gazette."

Honey Production Returns.

A regulation has been issued under the Primary Producers' Organisation and Marketing Acts requiring all beekeepers to furnish to the Minister by not later than the 23rd April information regarding the quantity of honey produced by them during the fifteen months ending on the 31st March, 1929. At the same time Metropolitan commission agents are required to furnish a return for the same period regarding the quantity of honey received by the agent from beekeepers. Further, wholesale merchants are required to furnish a return showing the quantity of honey purchased by them during the fifteen months ending 31st March, 1929.

Federal Bounties—The Case for Cotton.

Mr. F. M. Forde, M.H.R., in defending the cotton industry, has recently pointed out that, out of a total amount of £895,498 spent on bounties by the Commonwealth Government for the financial year 1927-28, only £81,453 was paid on seed cotton and £24,846 was paid on cotton yarn. The wine export bounty amounted to £482,483, and the other bounties were made up as follows:—Sulphur, £57,377 0s. 9d.; Papua and New Guinea, £194 8s. 10d.; canned fruit, £4,730 9s. 7d.; shale oil, £427 11s. 8d.; iron and steel products: wire netting £73,872 10s. 6d., fencing wire £104,485 7s. 10d., galvanised sheets £65,128 6s. 3d.; tractors, £140. Mr. Forde is now actively engaged in endeavouring to induce the Federal Government to give effective protection to the cotton industry before Parliament rises.

Valedictory.

The officers of both the Cotton Section and the Division of Entomology and Plant Pathology of the Department of Agriculture and Stock gathered on Saturday morning, 9th March, to bid farewell to Mr. G. A. Currie, who has occupied the position of Assistant Cotton Entomologist for the past few years. Mr. Currie is leaving Brisbane for Canberra for the purpose of taking up an appointment as Entomologist in Charge of the Noxious Weed Investigations under the Council for Scientific and Industrial Research.

Mr. Veitch, Chief Entomologist, presented a pair of silver-backed brushes as a token of the esteem in which Mr. Currie is held by his fellow officers, and in some well-chosen words extended the best wishes of those present. Mr. Wells, Government Cotton Specialist, in seconding Mr. Veitch, spoke in high terms of Mr. Currie and his work. Mr. Currie suitably responded, and mentioned that he hoped that his leaving Brisbane would not sever his connection with the friends he had made in the Department.

Youth's Opportunity.

"Learn to say 'No' to yourself in matters of pleasure.

"Start early at the bottom of the ladder.

"The men who 'live well,' but 'not too well,' get on best all over the world.

"The future may see lads going into a factory for two years, then to a university.

"Grumbling should be kept to oneself.

"If a young man can manage to take as much interest in the business he has entered as he does in, say, football, cricket, or motor-cars, there is not much fear of his troubling about whether the dole will be increased or diminished.

"No man will be a success in a calling he dislikes.

"The next crop of millionaires are licking our stamps now."—From a symposium on the subject of success in business, compiled by Mr. R. B. Dunwoody, Secretary of the Association of British Chambers of Commerce.

Egg Board.

By Order in Council under the Primary Producers' Organisation and Marketing Acts the constitution of the Egg Board has been extended until the 31st December, 1933. This Board deals with the owners of fifty fowls and over.

Citrus Levy Regulations.

The Citrus Levy Regulations under the Fruit Marketing Organisation Acts have been extended to all citrus fruits marketed for the year ending 28th February, 1930. The levy will be at the rate of 1d. per bushel case, ½d. per half bushel case, and 4s. per ton, payable on all citrus sent forward to any firm or person carrying on the business of a fruit-canner, fruit-preserved, jam or pulp manufacturer, or juice extractor.

New Sanctuaries for Useful Animals and Birds.

Fisherman Islands, in the estuary of the Brisbane River, have been declared a sanctuary for animals and birds.

The boundaries of a previously constituted sanctuary in the Hughenden district have been extended to include portions of Chudleigh Park and Pine Tree Holdings.

Banana Board Poll.

Following is the result of a poll to decide the question of the formation of a Banana Board:—

For the setting up of a Banana Board 854 votes.

Against the setting up of a Banana Board 1,121 „

The proposal therefore lapsed.

A Remedy for Slippery Concrete Floors.

To overcome the risk of cattle slipping on concrete floors sprinkle some ordinary ground lime (unburnt) over the floor daily after cleaning.

This treatment checks the formation of a slippery surface film that arises from the frequent hosing of the floors. It also acts as a slight disinfectant and deodorant and gives a clean white floor.

Egg Board Election.

The result of the election of the No. 5 District (Darling Downs) representatives was:—

Francis Bell Common (Toowoomba) 185 votes

William Dearling (Oakey) 113 votes

The members of the new Board will therefore be Messrs. R. B. Corbett, M. H. Campbell, A. McLauchlan, T. Hallick, F. B. Common, and L. R. Macgregor (Director of Marketing). The new members are Messrs. Hallick and Common.

Strawberry Board.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts constituting a Strawberry Board for a period of one year. The Board to deal with the commodity will consist of three elected representatives of growers and the Director of Marketing, such members to hold office till the date of expiry of the term of the Board. The whole of the commodity will be divested from the growers and become vested in and be the property of the Board as owners.

The following nominations have been received by the Department of Agriculture and Stock for the election of the three growers' representatives on the newly constituted Strawberry Board:—

S. J. Howe, Woombye.

H. T. Mills, Wynnum West.

G. E. Wort, Cleveland.

As only the required number has been nominated these growers, together with Mr. L. R. Macgregor, Director of Marketing, will therefore be appointed to hold office until the 27th March, 1930, the date of the expiry of the term of the Board.

Nature and Statesmanship.

"Cutting deep into the problems of modern life, are the the lessons of Nature—the nemesis of parasitism, for it spells degeneracy; the dangers of sluggish existence, when the environment is so apt to master the organism; and the risks that are run whenever Nature's sifting ceases, and is not replaced by some higher form of selection. A society that dispenses with sifting is working out its own doom. Other things equal, one would always trust the judgment of a country-bred statesman more than that of one wholly urban, for the man who is at home in the country has the deep impressions of growing and developing which cannot be safely dispensed with by those who would legislate for human life. Especially in a necessarily mechanical age is it folly to allow our children to grow up out of touch with living nature. This is not a question of educational opinion. It is a matter of life and death. It was said long ago that 'Man does not live by bread alone.' There is a complementary warning, 'Organisms cannot be nurtured on mechanisms only.'"
—Professor J. Arthur Thomson.

Man Must have a Focus.

"A philosophy of life is of immense practical value. A man has to find a focus in his life; some permanent abiding place in this world of change. He may not go far, but he will go far enough to put into some shape what he thinks to be permanent. Again, every intelligent man tries to give some sort of satisfaction to his reflective interest in the world. A philosophy of life supplies him with a standard of judgment. It gives him a sense of proportion and perspective—sometimes a sense of humour, which is the same thing—and if a man has both a sense of humour and a philosophy of life he is a happy man. A philosophy of life enables a man to link up the past, the present, and the future, to adjust himself to the necessities of circumstances, and to reconcile himself to the system of the world in which he finds himself. If there is anything that will give a man freshness from day to day it is working on a principle which is not for the moment, but which has an aspect of eternity in it."—Dr. J. B. Baillie, Vice-Chancellor of Leeds University.

The Dingo—A Few Hints on Poisoning.

In the February issue advice was given on the trapping of the dingo, and the same general principles as mentioned in connection with trapping can be followed in regard to the placing of baits, trails, and decoys.

Butter fat, fish, liver, kidney, pork, meat, and suet are all excellent baits. The first two are rolled into balls, the remainder cut into 1-in. cubes. Strychnine is probably the best poison to use, and 3 grains (as much as would fit on a threepenny piece) is sufficient. This is inserted into the middle of the ball or cube through a small knife slit. If practicable, do not touch the bait with the naked hands. If this is done, scorch it over a flame to eliminate any human odour.

One American bulletin, in reference to coyotes, states that a carcase should not be poisoned, but that coyotes should be allowed to eat some of it and the poison baits should be placed all round it, 20 to 30 ft. away. The same bulletin suggests the placing of strychnine in small gelatine capsules in the bait to prevent as far as possible its nauseating taste. In Western Australia the following plan was adopted. Sheep were placed at night in a small dog-proof yard in the middle of the paddock. From this yard radiating trails were made by dragging a carcase or a fish, and round the fence of the yard poison baits and traps were set.

* Carcases of dead lambs may be poisoned by inserting 3 grains of strychnine into a muscular portion through a knife slit. When baits are placed on the ground always have them as fresh as possible, and covered with a few dried leaves or a piece of bark. Another method is to wrap the bait in a piece of newspaper. The dingo, being essentially an inquisitive animal, will unroll the paper and devour the bait. This trick may not work for long, the animals becoming very suspicious of the paper after a time.

Although, as a general rule, the best work in connection with the destruction of dingoes can be done during the spring and summer, when the young and inexperienced pups are about, there is an exception to the rule, and it is in regard to poisoning, which is best carried out in the cooler months of the year.

A Warning.—Strychnine is a powerful and deadly poison to man and animals, and should always be regarded as such. Label all containers with a poison label, and be careful to wash the hands thoroughly after using, and never allow it to be placed near any food. Domestic dogs should be chained up and neighbours notified of intention to lay poison. Notices should be erected on land and placed in local newspapers that poison baits will be laid.

Ideals, Talk, but what of Action?

"The too talkative exponents of the 'higher life' in commerce have only themselves to thank when satirists grow merry (or ferocious) over the spectacle of the business man as evangelist," says the "Manchester Guardian." "After all, a virtue that was so very well advertised would not be tolerated in other walks of life; we should soon grow tired of a doctor or lawyer who was always dwelling on his own altruistic motives, and there seems to be no reason why a business man should be allowed to sing his own praises so insistently. Service is a very fine ideal, but it is most convincing when it is least self-conscious."

Life.

"Life gets very much of its thrill and interest from the fact that it is always a going-forth into the unknown. What will come to us through the months of this year upon which we are just entering not one of us can say, but it is that very limitation of our knowledge that helps to keep the whole great enterprise of living full of zest and eagerness and expectation. Whether we will it or not, life must always be more or less of an adventuring, a trying of new paths and a meeting of unexpected difficulties and testings and opportunities. This is not something to be complained against; it is something to be rejoiced in—something, indeed, to be lived up to, to the full. Much more than many of us do, we should think of life as a great adventure, and thus keep in it the zest of great hopes and eager anticipations. There is a great truth in that thought; a truth, however, that many of us seem to miss, and just because we miss it our lives have lacked so much the zest and keenness and the interest that they ought to have."—"The New Outlook."

Motor Headlights—Dimming Condemned.

The question as to whether a motorist should switch off his headlights upon approaching a vehicle travelling in the opposite direction has been discussed from all angles, but has been revived by what is thought to be the first case in England in which a motorist has been censured by a coroner for dimming his lights, and so causing a fatal accident. Fortunately the practice is dying out in Australia, although a number of drivers still consider it an act of courtesy to switch off their lights when approaching another car, particularly on country roads. After years of driving in the country, the writer is convinced that, generally speaking, it is a bad practice to switch the headlights on and off on meeting approaching traffic, but he is also fully convinced that there should be more rigid control of glaring headlights. Although the headlights are supposed to throw their beam of light on to the roadway not more than 60 yards in front of the car, many of them are cocked up so that the beam does not strike the road at all, but is directed right into the eyes of the drivers of approaching cars. It is the writer's practice, when approaching glaring headlights, to keep his eye on the road (excluding as much of the glare as possible), and to slow down until the "offending" car has passed.

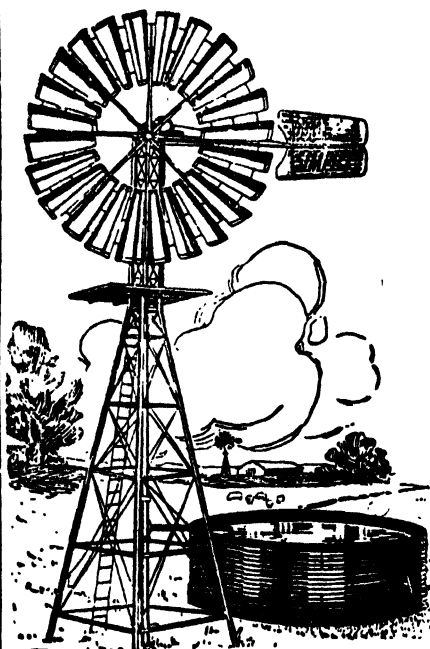
Commenting upon the occurrence in which the coroner in England censured the driver for dimming his headlights, "The Motor" says that two men were pushing a barrow across Blackheath, and the car crashed into them from the rear, resulting in the death of one of the men. The motorist said that as he was proceeding across Blackheath another car coming in the opposite direction with headlights on dazzled him so much that he switched his own off, thinking that the other motorist would do the same. The other motorist did not do so, however, and in turning into the near side the crash occurred.

The jury returned a verdict of accidental death, but said that the accident was due to the bad driving of the defendant.

The coroner, agreeing with the jury, said that he did not think the defendant was fit to drive a car. It was not right to shut off his headlights and to blind himself so that he could not see the barrow. He considered it very bad and wicked driving—gross negligence that might have influenced the jury to return a verdict of manslaughter.

The case (says "The Motor") is one that undoubtedly clearly reveals in a tragic manner the danger of switching off, but the coroner's strictures were rather severe. There are evidently some motorists that still consider cutting out the headlights an act of courtesy, and although the risks of doing so are enormous it does not necessarily follow that a man that does it is not fit to drive a motor car.

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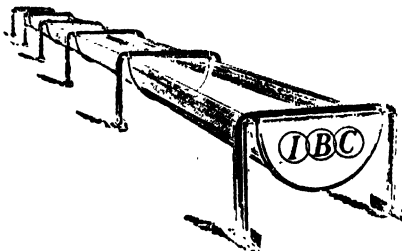
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The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.

THE MANAGEMENT OF BABY.

On the treatment and training which an infant receives in the first twelve weeks of life depends greatly its progress during the ensuing twelve months. The opinion is frequently expressed that the new-born baby is too young to be trained; this is a mistake. Even very young babies quickly acquire habits, and it is important that they should be of the right kind.

To delay training until he is a few months old may, and probably will, result in giving mother or nurse a great deal of trouble, and the baby much unnecessary distress. So begin as you mean to go on.

The First Bath.

The first bath should be performed quickly. The new-born infant is not yet used to his new surroundings, and is very easily chilled. For this reason oil and bath him as quickly as you can; dress him, and see that he is warm and comfortable. He will probably be very drowsy and inclined to sleep for some hours. Newly-born infants should sleep more than three parts of their time, and for the first few days practically all the time they are not occupied with bathing and feeding.

The Baby's Bassinette.

From birth baby should have his own cot; he should never sleep with his mother. Not only is it healthier for him to sleep alone, but he sleeps better so. Some people think that the baby requires to sleep with his mother for warmth. This is a mistake. A healthy baby will, for most of the year, keep comfortably warm without any external heat other than that supplied by the bedclothes on his cot. For the coldest months, if he is inclined to be chilly, his bed can be warmed with a hot water bag or bottle, carefully placed with the stopper or cork inclined downward, so that there is no possibility of baby being burnt, even if the stopper or cork should accidentally come out. He should be accustomed from birth to sleep without a light. People who have had much experience with young babies notice that their sleep is more likely to be sound and undisturbed if there is no light in the room.

Feeding the Infant Australian.

Now for the feeding of the new baby. This is a most important matter, and probably more mistakes are made on this than any other point in the management of infants.

Most babies when born know how to suck. It is seldom we find one who cannot do so. This is because for long ages past babies have been fed at their mother's breasts, and at birth the sucking instinct is present. This instinct must be developed, but care taken that it is done on the right lines. It must not be either underdeveloped or overdeveloped. If baby, who very often in these first days of life is very sleepy indeed, is allowed to sleep almost undisturbed, he may at the end of a day or two be very unwilling to work for his living. For that is what sucking is to a baby, and there is no more difficult child to manage than the one who has not been trained to suck properly. Feeding him from a feeding bottle, with the hole in the teat so large that the fluid pours down his throat without effort on his part, will also result in disinclination to suck.

The instinct can be over stimulated by putting baby too frequently to the breast, or by leaving him there for too long a time. Also by giving him a dummy to suck constantly.

Vigorous sucking is necessary for his health, but it should be done regularly and at proper feeding time only. In the early months of life it forms a very important part of baby's daily exercise, for not only does it develop jaws and mouth but it improves the circulation of the whole body.

There is another reason why baby should be trained to correct feeding habits early. We all know that the mother's full milk supply does not come in until the end of the second or the beginning of the third day after baby's birth. But before the milk comes in there is a little creamy-looking fluid in the breasts. This the baby should have, for although there is very little it has high food value, and at this time no other food can take its place. In addition, the mother's health also is benefited, and she makes a quicker recovery if baby is put regularly to the breast at this time.

Put baby to the breast within about six hours of birth—as soon as the mother has rested—leaving him only about two minutes at each breast. See that he is actually sucking and not dozing. It will be sufficient to do this once every six hours for the first day. On the second day leave him three or four minutes at each breast, and feed him every four hours. On the third day, when the milk supply is usually established, put him to the breast every three hours, and leave him about fifteen minutes. The average baby takes from fifteen to twenty minutes to feed. No baby should be left at the breast for longer than thirty minutes, and it is only delicate babies or those who suck feebly who should require so long.

Alternate the commencing breast—i.e., if you begin by giving the baby the right breast for his first feed, commence with the left for the second, the right again for the third, and so on.

The Value of Early Training.

Big strong babies generally do well if fed every four hours—that is, five feeds daily—from the third day. Others are better on three hourly feeding (six feeds daily) until they are about three months old. After that time four hourly feeding suits most infants, but never jump suddenly from three to four hourly feeding. Increase the intervals by a quarter of an hour every second or third day until a four hourly interval is reached. This can be done without baby being aware that any change is being made. Give no night feeds from birth. This is most important. If this is done from the start of life baby learns to take all that he needs in the day time. This allows him and his mother to get the regular uninterrupted night's sleep which both require. A baby trained from birth to have no night feeds takes during the day all he requires to satisfy his hunger, and for his growth and development.

If fed in the day only he obtains just as much as if he were being fed both day and night. For example, careful weighing of children before and after feeding has shown that a child having, say, 30 oz. of food in the twenty-four hours, and given six feeds a day, takes 5 oz. at each feed, while if he is fed ten times a day he takes 3 oz. at each feed, thus obtaining exactly the same quality of food in the twenty-four hours.

Regular Habits.

But this training must start at birth. A baby accustomed to being fed night and day will protest vigorously if his mother suddenly lengthens his feeding intervals. He has been trained to frequent feedings, so takes only sufficient to satisfy his hunger for that period. But when started from birth on regular three or four hourly feeds, with no night feeds, he never expects anything else. So keep absolutely to regular feeding times; make no exceptions. To do so one day will almost certainly result in the baby demanding the same concession the next day. Never hesitate to wake baby during the day when feeding time comes round. Very soon he will learn to wake himself at the right time. If he is allowed to sleep over his feeding time during the day, he cannot be expected to sleep all night. He will not have had his full supply of food, so will be hungry and restless.

One more very important point before closing. Mention has already been made of the fact that the mother's milk does not come in until the second or third day. As a result, many people think it their duty to give baby artificial food during this time. This is a great mistake, which can lead to much trouble, and in many cases has been responsible for the unnecessary weaning of the baby.

Important Points to Remember.

If baby required food during the first two days of his life Nature would supply it. The very fact that it is not there proves it to be unnecessary. As previously mentioned, baby needs the little fluid there is in the mother's breasts at that time.

and should be put regularly to the breast to obtain it. Beyond this nothing but plain boiled water should be given. Babies who are fed on sweetened water or condensed milk as their first food not infrequently refuse to take their natural food later. The reason is simple. Cane sugar, which sweetens both sugar and water and condensed milk, is very sweet. Mother's milk contains a different sugar, called sugar of milk; this is only faintly sweet. Babies like sweet things, and show their preference by refusing to take their proper food.

Important points to remember in feeding baby are—Commence training at birth; feed regularly; give no night feeds; wake baby when necessary during the day; make no exceptions.

THE COUNTRY GIRL'S OPPORTUNITIES.

What opportunities has the country girl for broadening her mind? Doesn't that to a great extent depend on the individual girl?

It is certain that, fundamentally, some one thing more than any other appeals to each one of us. It may be music, literature, art, nature study, appearance, conversation—what you please, but it is there. For the country girl some "bents" are more difficult to satisfy than others, but none is impossible.

Thin, eager persons are often obsessed by one idea that they will satisfy, come what may; their more weighty sisters of both town and country are not so eager—interest in all round them does not come to them spontaneously. They must cultivate an interest; they must—it sounds unkind, but it is true—they must thin the body and fatten the wit.

Be keen on something, anything; almost everyone has a love of reading; it begins with nursery rhymes and fairy stories; later it may develop into a desire for Deadwood Dick—or Ethel M. Dell; perhaps from her to Zane Grey, and then to Scott's novels and ballads.

Every book, however trivial, has in it something to digest. I will admit some are calculated to give one a severe attack of dyspepsia before being assimilated; however, one can lead up to this stronger meat from the candy-and-cream-cake variety.

Motor-cars and wireless are perhaps the greatest factors in the evolution of the country girl. Both eliminate space and bring the big things of the world nearer. Many persons that cannot afford a car can afford a good wireless set, and with it much of the news and beauty that is in the world is brought right into the home.

Supposing the farm girl wants to improve her appearance, to dress better; for the reading she can have fashion articles by the world's greatest authorities; while from the advertising section she sees where to go and what to buy for her various needs.

Perhaps the happiest girls in the bush are those with a love of gardening and of wild things; and not only wild things, for they have the opportunity to keep their own horses and dogs.

Only when one has always loved the "first friend" and has no longer anywhere to keep him, does one realise how terribly empty a place he leaves, a longing that no human companionship can supply.

All Australian bush creatures are queer and thrilling. I have found baby porcupines, soft and pink and spineless, caught turtles from the river no bigger than pennies, seen bright coloured tree-snakes, and tried to track the wily platypus to his lair—and failed!

Kangaroo joeys, 'possums, &c., are more commonplace, but are very sweet and alluring babies, with soft fur and big frightened eyes.

The birds are a never-ending pageant. There are always newcomers, migrants from far-away lands; and in November nests full of queer little fledglings, bold and hungry, entirely selfish and very noisy.

Most country towns—even the bush towns—have their picture shows. Usually one reel illustrates some constructive subject that the world is interested in, and the others if not always first-class as pictures go are anyway spirit trips to other times, other places and people—travel of a sort to those who are moored in one place which, however loved, cannot quite kill the longing for adventure and the wanderlust so strong in some of us.

I have purposely left until the last the most unusual and yet most obvious pleasure for everyone; the use of that gift which places us so far above even the aristocracy of the animal world—speech. Speech, so often abused by rehearsing tittle-tattle, is still the medium of expression from one human soul to another.

The hero of one of William Morris's books describes someone very dear to him in these words: "He is my speech-friend." Most men have one particular pal in whose company they find perfect happiness, just having a yarn. He is the speech-friend.

In "The Patsy" now playing in Sydney, Patsy regrets her inability to talk wittily, so that, when she sees a book advertised as containing witty remarks for every occasion, she buys it, learns the bon mots by heart, and tries them on her distracted family, who think she has gone mad!

This is rather too drastic a way to become a conversationalist, but when all is said and done it is this gift alone that enables us to think and feel for and with others that gives sympathy and understanding to those we love. I quote from Mr. Hilaire Belloc:—

"From quiet homes and first beginnings,
Out to the undiscovered ends,
There's nothing worth the wear of winning
But laughter and the love of friends."

—"Gunnyan," in "The Farmer and Settler."

KITCHEN GARDEN.

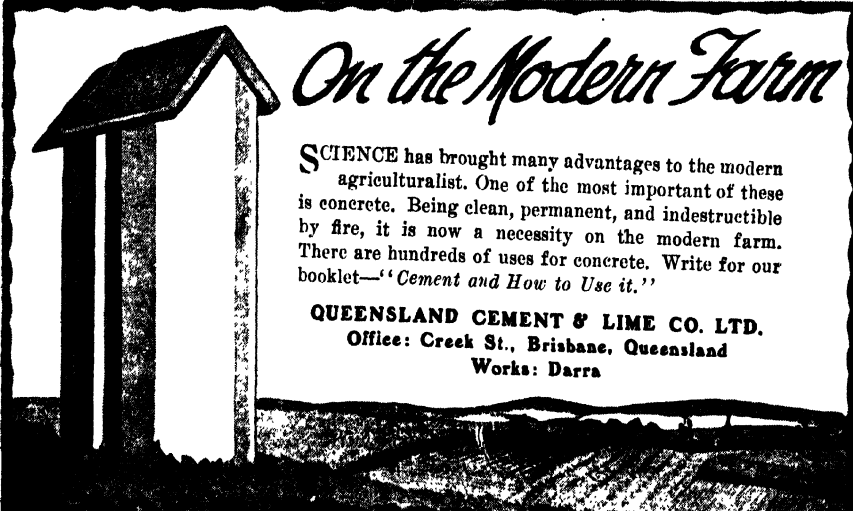
Onions which have been planted in seed beds may now be transplanted. The ground should long since have been thoroughly cleaned, pulverised, and should be rolled previous to transplanting. Onions may still be sown in the open on clean and well-prepared ground. In favourable weather plant out cabbages, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these as well as of peas, broad beans, khol-rabi, radishes, spinach, turnips, parsnips, and carrots, and, where sufficiently large, thinned out. Dig and prepare beds for asparagus, using plenty of well-rotted farmyard manure.

FLOWER GARDEN.

Planting and transplanting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, pentstemons, heliotrope, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia bulbs should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snow-flakes, freesias, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate, but hyacinths may be tried, although success is doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

THE BOY, THE FARM, AND HIS OPPORTUNITY.

Apart from the fact that the prosperity of the Dominion is dependent upon the successful cultivation of the land, from which 90 per cent. of its exportable produce is derived, it is plain that the greater the number of people who are settled in country pursuits the larger must be the demand for the output of the secondary industries and the more extensive the opportunities for the employment of young people in these industries. Yet it is not by telling them this that the bias towards work in the towns on the part of the young will be overcome. It has to be brought home to their minds that, after all, their material interests are more likely to be served by their turning their attention to rural pursuits than by their remaining in the towns and hanging about the streets in the hope of their securing a place in an office or a shop or a factory that may ultimately not lead them very far. It has been pointed out that the proportion of persons engaged in the rural industries who are their own masters is several times greater than it is in any of the secondary industries or in commerce, and, consequently, that the youth who is induced to accept employment on the land has a better chance of attaining independence than he has in any calling outside the learned professions."—"Otago Daily Times" (N.Z.).



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Molly Sharman Crawford—White.
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|-------------|-----------|
| ALLORA | KINGARROY |
| CHARLEVILLE | LAIDLEY |
| CLIFTON | MITCHELL |
| COOROY | MURGOON |
| DERRANBANDI | ROMA |
| GATTON | SOUTHPORT |
| GOOMERI | TOOWOOMBA |
| GOONDIWINDI | WARWICK |
| KILLARNEY | WONDAI |
| | WOOMBYE |

Further depots are being established.

C.O.R. BRITISH MOTOR SPIRIT

The Commonwealth Oil Refineries Ltd.
(Commonwealth Government and
Anglo-Persian Oil Co. Ltd.)

Agents:

Dalgaty & Co. Ltd. - Brisbane
C282/S.1.

Farm Notes for May.

FIELD.—May is usually a busy month with the farmer—more particularly the wheatgrower, with whom the final preparation of his land prior to sowing is the one important operation. Late maturing varieties should be in the ground by the middle of the month at the latest.

Clover land, intended primarily for feeding off, should be sown not later than the end of April.

The necessity of pickling all wheat intended for sowing purposes is again emphasised; and for general purposes, combined with economy in cost of material, the bluestone and lime solution holds its own. To those who desire an easier but somewhat more costly method of treatment, carbonate of copper at the rate of 1 oz. to the bushel and used in a dry form is suggested.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. All consignments to the ginners should be legibly branded with the owner's initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

Orchard Notes for May.

THE COASTAL DISTRICTS.

In these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become speckled or blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from 2½ to 2¼ in. in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or specking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of specky or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are

given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply cultivated, and be thus able to retain an adequate supply of moisture in dry periods. Do not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples well be coming forward in quantity, and the greatest care should be taken to see that they are properly graded and packed for the Southern markets, only one layer of one sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. diameter in a single layer.

Slowly acting manures—such as meatworks manure—may be applied to orchards and vineyards during the month; and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now, as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Clean up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give birds and predaceous insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Further, it is a good plan to clean up the land before pruning takes place as, if delayed till the pruning has been finished, the land is apt to dry out in a droughty season.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work through as early in the season as possible, instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—*not vines*, as the later vines are pruned in the season, the better in the Granite Belt district, as late pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will become sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manure—such as ground island phosphates or basic phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland; and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled, they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

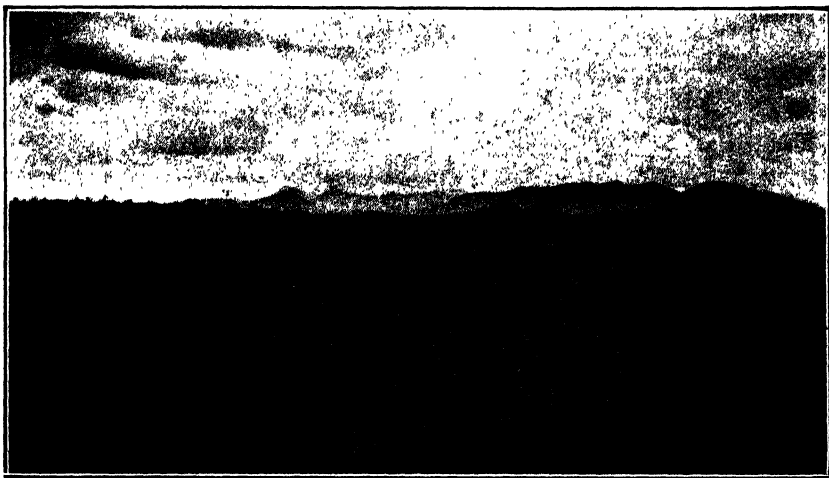


Photo.: Jean Easton.]

PLATE 1.

The Macpherson Range is an Imposing Background to this Stretch of Rich Pasture Land on Coochin.

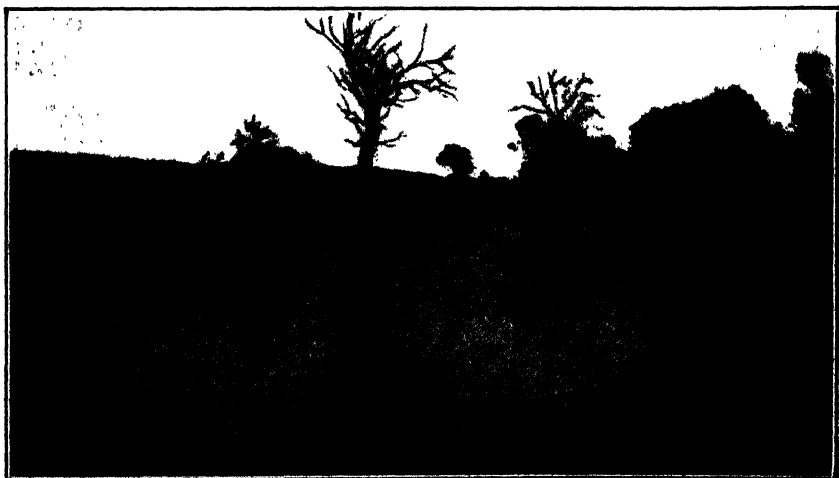


Photo.: Jean Easton.]

PLATE 92.

A Favourite Spot, when the day's work is done, the Coochin Swimming Hole.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

| Date. | April, 1929. | | May, 1929. | | April, 1929. | May, 1929. |
|-------|--------------|-------|------------|-------|--------------|------------|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| 1 | 6.4 | 5.48 | 6.21 | 5.17 | p.m. 10.25 | p.m. 10.54 |
| 2 | 6.5 | 5.47 | 6.21 | 5.16 | 11.16 | 11.51 |
| 3 | 6.5 | 5.46 | 6.22 | 5.15 | 0.0 | a.m. 12.49 |
| 4 | 6.6 | 5.45 | 6.23 | 5.14 | 12.11 | 12.49 |
| 5 | 6.7 | 5.43 | 6.24 | 5.14 | 1.6 | 1.48 |
| 6 | 6.7 | 5.42 | 6.24 | 5.13 | 2.5 | 2.47 |
| 7 | 6.8 | 5.41 | 6.25 | 5.13 | 3.5 | 3.48 |
| 8 | 6.8 | 5.39 | 6.25 | 5.12 | 4.4 | 4.50 |
| 9 | 6.9 | 5.38 | 6.26 | 5.11 | 5.5 | 5.55 |
| 10 | 6.9 | 5.37 | 6.26 | 5.11 | 6.6 | 7.8 |
| 11 | 6.10 | 5.36 | 6.27 | 5.10 | 7.10 | 8.17 |
| 12 | 6.10 | 5.35 | 6.27 | 5.10 | 8.16 | 9.27 |
| 13 | 6.11 | 5.34 | 6.28 | 5.9 | 9.25 | 10.33 |
| 14 | 6.11 | 5.33 | 6.28 | 5.9 | 10.34 | 11.31 |
| 15 | 6.12 | 5.32 | 6.29 | 5.8 | 11.40 | 12.23 |
| 16 | 6.12 | 5.30 | 6.29 | 5.7 | 12.40 | 1.3 |
| 17 | 6.13 | 5.29 | 6.30 | 5.7 | 1.35 | 1.40 |
| 18 | 6.13 | 5.28 | 6.30 | 5.6 | 2.22 | 2.12 |
| 19 | 6.14 | 5.27 | 6.31 | 5.6 | 3.2 | 2.42 |
| 20 | 6.14 | 5.26 | 6.32 | 5.5 | 3.38 | 3.12 |
| 21 | 6.15 | 5.25 | 6.33 | 5.5 | 4.9 | 3.43 |
| 22 | 6.15 | 5.24 | 6.34 | 5.4 | 4.39 | 4.16 |
| 23 | 6.16 | 5.23 | 6.34 | 5.4 | 5.11 | 4.52 |
| 24 | 6.16 | 5.22 | 6.35 | 5.3 | 5.40 | 5.30 |
| 25 | 6.17 | 5.21 | 6.35 | 5.3 | 6.16 | 6.14 |
| 26 | 6.17 | 5.20 | 6.36 | 5.2 | 6.53 | 7.3 |
| 27 | 6.18 | 5.19 | 6.36 | 5.2 | 7.35 | 7.54 |
| 28 | 6.18 | 5.18 | 6.37 | 5.1 | 8.23 | 8.48 |
| 29 | 6.19 | 5.18 | 6.37 | 5.1 | 9.12 | 9.42 |
| 30 | 6.19 | 5.17 | 6.38 | 5.0 | 10.5 | 10.40 |
| 31 | | | 6.38 | 5.0 | | 11.36 |

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | | |
|--------|---|---------------|-----------|
| 2 Apr. |) | Last Quarter | 5 29 p.m. |
| 10 " | ● | New Moon | 6 32 a.m. |
| 17 " | (| First Quarter | 12 9 a.m. |
| 24 " | ○ | Full Moon | 7 37 a.m. |

Apogee, 1st April, at 11 12 a.m.

Perigee, 13th April, at 7 30 a.m.

Apogee, 29th April, at 5 0 a.m.

Mercury will be passing from the west to the east side of the Sun on the 17th, only very slightly above its upper limb. It will, of course, be entirely invisible in that position, but will not set till about 45 minutes after the Sun on the 30th.

On the 20th, Venus will be passing the Sun on the earth-side of its orbit, but nearly 6 degrees below it at midday; it will then have its dark side to the earth, but will come into view as a morning star a few days later, and will be seen about an hour before sunrise near the eastern horizon at the end of the month.

The Moon will be passing about 5 degrees south of Saturn soon after midnight on the 28th.

Mars will be, apparently, amongst the stars of Gemini during this month; Jupiter in Aries; Saturn, almost stationary, in Sagittarius; Uranus moving very slowly eastward in Pisces; and Neptune very near Regulus in Leo.

The Southern Cross on the 1st April will be at position IX, on an imaginary clock face in the sky, 30 degrees east of the south celestial pole at about 6 p.m., and at position III, 30 degrees west of the pole about 6 a.m. It will, therefore, be upright and at its highest position (58 degrees above the southern horizon at Warwick) at midnight. This imaginary clock face, having the south celestial pole as its centre, with a diameter of 68 degrees, will afford all the varying positions of the Cross throughout the year and during every twenty-four hours. The pole will always be the same number of degrees above the southern horizon that the observer is from the equator.

| | | | |
|-------|---|---------------|------------|
| 2 May |) | Last Quarter | 11 25 a.m. |
| 9 " | ● | New Moon | 4 7 p.m. |
| 16 " | (| First Quarter | 6 56 a.m. |
| 23 " | ○ | Full Moon | 8 49 p.m. |

Perigee, 11th May, at 6.6 a.m.

Apogee, 26th May, at 5.54 p.m.

The conjunction of the Moon and Venus on the 7th will take place too nearly in the direction of the Sun to be observable.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 20 minutes; at Thargomindah, 26 minutes; and at Oontoo, 32 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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VOL. XXXI.

1 MAY, 1929.

PART 5.

Event and Comment.

Agricultural and Pastoral Prospects.

OWING to the favourable weather conditions which prevailed during the past quarter throughout those portions of the State where dairying is carried on, the outlook of that industry is very bright. Native pasturage and introduced grasses have made vigorous growth and, in localities where early rain fell, grasses have matured and seeded and late rain has promoted a fresh growth so that the pastures are in an excellent condition for the autumn and winter. Heavy cuttings of lucerne have been obtained, and large quantities have been conserved as hay. Owing to the heavy crops of maize, sorghums, and millets, much of this fodder is available for conservation, and advantage of this has been taken in some districts. The production of butter for the month of February (9,440,200 lb.) constituted a record, exceeding that of January, 1928 (9,293,368 lb.), which was the former peak month in production, by 146,832 lb., while the amount of cheese manufactured in January and February of this year totalled 2,951,667 lb. Dairy stock are in excellent condition and should winter well, as there is every indication of ample supplies of green fodder being available to supplement the natural pasturage. It is expected that the production for the ensuing three months will be above the average for the corresponding period of past years.

The Sugar Crop.

THE first quarter of 1929 was marked by continuous heavy rains in the sugar areas north of Mackay. Exceptionally heavy rains were experienced north of Townsville, and over 100 inches were recorded at the South Johnstone Station, where the crops are reported as being well advanced. The Burdekin area is at present looking exceptionally well, and good rains have precluded the necessity for irrigation. The Bundaberg district received good rains in February, and the crops responded well to the succeeding hot weather. It is rather early yet to give an estimate of the sugar production for the coming season, but general indications are that it should equal the crushing of 1928.

Promise of Good Wheat Crop.

THE widely distributed rainfall, accompanied by other favourable conditions, has been responsible for the present satisfactory outlook for the agriculturist in the Southern division of Queensland, which includes those areas from the Tweed to the Burnett. Owing to the prolific growth of weeds the amount of work involved in the preparation of land for wheatgrowing has been heavy. This, however, should show its effect in the resultant crop and ensure sufficient soil moisture to enable sowing to be carried out expeditiously, and also for the maintenance of the crop during the greater period of its growth. The wheat sown for fodder purposes is well above ground, increased areas of Cleveland and Currawa varieties, which are useful for grazing-off purposes, having been sown in the Pittsworth and surrounding districts. In the Central district, where a very favourable germination is expected, sowing will probably be carried out at an earlier date than is usual on account of conditions of temperature and soil being so favourable.

Maize Ready for Harvesting.

THE maize crop, which in many instances is practically ready for harvesting, will be a heavy one, and provided that early frosts are not experienced on the Downs, the crop from that portion of the State should compare favourably with that of any other single season.

Cotton Being Harvested.

THE harvesting of the cotton crop is now in full swing, and good quality cotton is coming forward to both the Rockhampton and Brisbane ginneries, particularly the former. The picking should cease about the end of July.

Winter Fodders.

REPORTS indicate that considerable areas of winter-growing fodders have been sown, and that in many instances oats sown for grazing-off purposes are now 6 to 9 inches in height. It is anticipated that probably quite a reasonable area of canary seed will be sown for winter fodder, and, if climatic conditions continue favourable, portion of this may later be harvested for grain.

Small Crops.

THE present crop of peanuts gives every indication of being a heavy one, and record yields have been quoted in a few instances. It is anticipated that a considerable increase in the area under peanuts will take place during the present year.

The season has been very favourable to the growth of broom millet in the Central districts, and excellent returns are being secured, while the prices received from the parcels already marketed are very satisfactory.

With the abundance of grass and the very favourable conditions at present existing for the growing of winter green feed, the outlook for the approaching winter is good. With every prospect for a good wheat crop and a satisfactory maize crop awaiting harvesting, optimism is quite justified.

Fruitgrowing.

IN most districts the outlook of the fruitgrowing industry is satisfactory. Bananas continue to do well along the North Coast, and there has been a fair extension in the banana areas in that portion of the State. Excellent bananas are also being produced south of Gympie on the recently-planted lands. In the Central district, particularly in the principal producing area, Byfield, the citrus crop is quite up to the average, and prospects are decidedly encouraging. In the Wide Bay district the quality of the citrus crops is good, and the fruit now being marketed is realising satisfactory prices. The tomato lands are being added to in the Bowen-Townsville area, while Mackay is giving more attention to tomatoes and other small crops.

Graziers' Prospects Bright.

CONSEQUENT upon the advantageous rains and the excellent condition of the herbage generally throughout the stock districts of the State, the outlook for the present quarter is very encouraging. Large numbers of cattle are being travelled to the meatworks, and Southern buyers have been very busy purchasing fat stock in the various districts. The cattle generally throughout the State are in good condition. With the exception of isolated cases of pleuro-pneumonia there have been few outbreaks of disease of any moment. Shearing has commenced in most sheep areas, and from all appearances the outlook for the grazier during the current quarter is bright.

Anzac.

ANZAC Day will remain for all time a fixture in the Australian calendar, and as the years pass the event that it marks is becoming less of a memory and more of a great and glowing tradition. The anniversary of the Epic of Gallipoli was commemorated fitly, amply, and reverently on 25th April in every town and hamlet throughout the Commonwealth; and also in those far countries where, with their comrades of New Zealand, Great Britain, and France, the Australian soldier won lasting fame. It was not the "glory" of war that was extolled, but the service and the sacrifice and all those things that exalt the souls of men in hours of crisis, that the Nation recalled with glowing pride. Those men of our race who, when human liberty was in the balance and the tocsin sounded went forth to fight and did not come home—those men who, in placing on the altar of their country's freedom their great gift of youth and life, became in a moment—

The living theme of boys unborn for countless centuries,
Peers of the noblest souls whom God has fired,
Part of the amplest feat of history—

were remembered, and will be remembered, "while the light lasts, and in the darkness we shall not forget."

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

The Bureau of Sugar Experiment Stations has received the following Plant Pathology notes (5th April, 1929) from the Division of Pathology attached to the Bureau:—

For some months the staff of the Division of Pathology has been chiefly engaged in making field surveys in various districts, with the object of determining the best sources of seed cane for the spring planting this year. The area which can be surveyed in this manner is naturally limited on account of the small staff available at present for the work. When such surveys as we are able to undertake are completed, the Bureau will issue lists containing the names of those growers who have cane suitable for seed. Growers who purchase seed from farms mentioned in the lists are reminded that, wherever possible, they should also make a personal selection of the seed they have ordered. It is quite reasonable to expect that occasionally a field will become infected with disease between the time of inspection and the time of cutting the cane for seed. Also, the Bureau officers cannot inspect every single stool of cane in the field, and in the case of Mosaic, for example, when only two or three stools per acre are diseased, it is quite possible that these stools might be missed altogether.

Lower Burdekin.

Downy Mildew or Leaf Stripe is probably the major disease of the Lower Burdekin, on account of the fact that it is responsible for the gradual disappearance of B.208 from the canefields of that area. B.208, when free from disease, produces such remarkable yields of sugar per acre that every effort should be made to save this cane. We think that it is possible to control Downy Mildew in the Burdekin area, where the winter months are so very dry and where practically no ratoons are grown. In attempting control there are two points to be observed:—

- (1) Rigid selection of the seed cane, and
- (2) The uprooting of any diseased plants as soon as they appear, that is, during the dry winter months.

With reference to seed selection, any cane should be rejected as seed cane if it is within 200 yards of even a single diseased cane. Mr. George Wilson, Assistant Pathologist, has recently spent three months in this district, making a comprehensive survey, and it is expected that his services will be available to the farmers of the Burdekin, for the purposes of seed selection, during April and May.

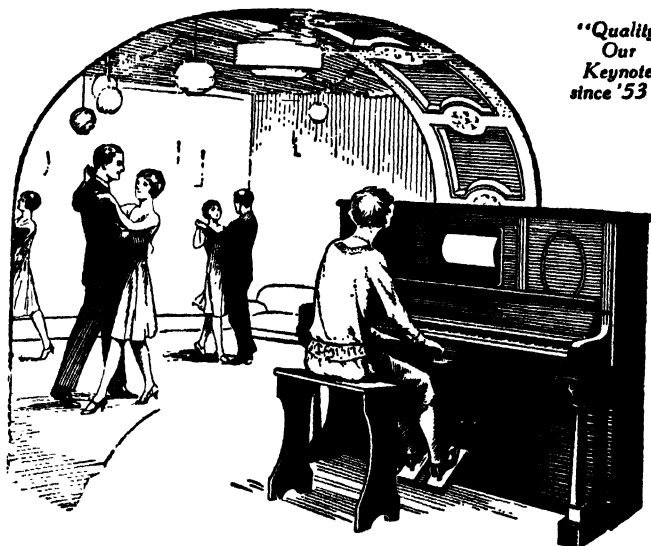
Farleigh.

A survey of the Farleigh area is nearing completion, and has been carried out by Mr. E. J. F. Wood, Assistant Pathologist. The chief problem in this district is to reduce the amount of Mosaic disease, and a list of farms which are practically free from Mosaic and other major diseases will be published in due course. Farmers who should on no account plant their own seed, will be notified privately. Mr. Wood will be stationed in the Mackay district for some time, and will be prepared to advise farmers on proposed sources of seed. Requests for a visit from Mr. Wood should be addressed to the Sugar Experiment Station, Mackay.

Bauple.

Mosaic has also been a serious problem in the Bauple area, and with the object of assisting the growers to combat this disease, by planting disease-free cane, Mr. N. L. Kelly, Assistant Pathologist, is now making a survey of the district. A list of approved farms will subsequently be published in the usual manner.

Mosaic is the most widespread of all serious diseases of sugar-cane, but in all parts of the world it has been shown that complete control may be obtained by the planting of selected seed, the uprooting of any diseased plants which may appear later, and clean cultivation. Crops such as maize and sorghums should not be grown near cane as they harbour the insect which spreads the disease. Most growers have no doubt read of the great decline of the Louisiana sugar industry, brought about largely by Mosaic disease. At the time of its recognition the disease had become too widespread to be controlled by seed selection. In 1925-26 practically the whole crop



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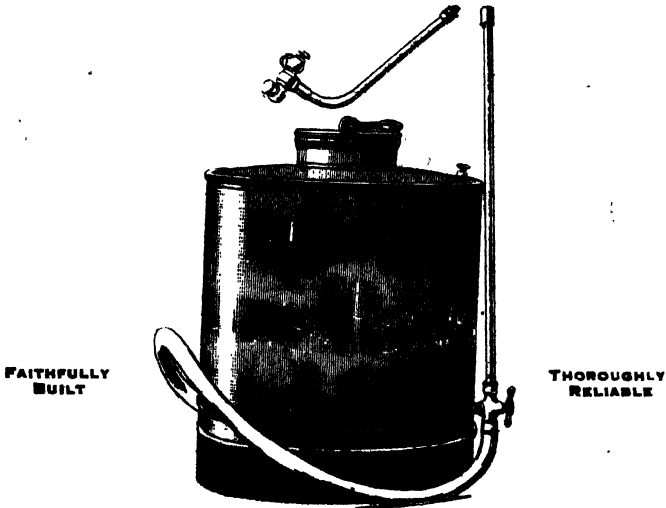
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was 100 per cent. infected, and production had fallen to about one-fifth the maximum figure. The situation required drastic measures, and a technologist with very wide powers was appointed. Under his direction a complete change-over is taking place to varieties which are highly resistant to Mosaic, and the result is that in two years the production has been more than doubled. The new Mosaic-resistant varieties which are now being grown are the Java canes P.O.J. 234, P.O.J. 36, and P.O.J. 213. These varieties were introduced into Australia, but have not shown sufficient promise under our conditions to warrant propagation.

North of Townsville.

Top Rot disease has been more common north of Townsville this year. At present our knowledge of this disease is not very extensive, and it is hoped that next year it will be possible for one pathologist to devote full time to the investigation of cause, transmission, and control. Observations on Top Rot in Queensland, and on the very similar Red Stripe in Hawaii, suggest that the most important factor in the control of the disease is the stage of growth of the cane at the commencement of the rainy season. That is to say, a vigorous, well-grown crop is likely to escape the disease. In this connection it is interesting to note that although the past year was extremely dry in the Burdekin district, yet on account of more frequent and more regular irrigations it was generally agreed that the 1928 plant cane was better grown than the crops in most years of normal rainfall. At the same time our surveys show that the amount of Top Rot is much below average this year.

It is also thought that early fertilisation may play a big part in the control of this disease, and the fertiliser experiments now being laid out on representative farms, by officers of the Bureau, will help to test out this theory.

Bundaberg.

During the past six months an exhaustive survey has been made of farms in the Bundaberg district, with the object of finding what quantity of disease-free seed is available. We have now a list of some forty odd more or less isolated farms on which we have found no trace of gumming in the cane on each of three inspections. These farms will be inspected once or twice more before July, and a list of those considered safe sources of seed cane will be published.

A number of properties have been inspected as a result of their being offered as sites for the propagation of disease-free cane, and the pathologist will visit Bundaberg next month for the purpose of making a selection of these.

According to the Annual Report of the Mauritius Department of Agriculture for 1927, gumming disease is on the increase. A detailed survey showed that the disease was causing severe damage in the variety White Tanna, which constituted 56 per cent. of the total crop. The crop was about 15 per cent. below estimate, and this was stated to be due mainly to the ravages of gumming diseases.

In September, 1928, sixty-seven varieties of cane were imported from Hawaii in our endeavour to find gum-resistant canes. These varieties were held up for some weeks on account of the waterside trouble, but nevertheless some sixty varieties were germinated, and are now growing in quarantine. No canes will be liberated unless they prove to be disease-resistant.

The necessity for the quarantining of introduced varieties is emphasised by the fact that both Mosaic and Fiji diseases were reintroduced in the Brandes collection of New Guinea canes, which are growing in Sydney.

CANE PEST COMBAT AND CONTROL.

The following report for the period March to April has been received by the Bureau of Sugar Experiment Stations from Mr. E. Jarvis, Entomologist, at Meringa, North Queensland:—

“When will you growers fight that Beetle pest
The Weevil-borer? Please don't let it rest.”

Some of you may ask the question—“But *when* and *how* should it be tackled?” In reply let me say that now, right away, is a good time in which to start a campaign against this serious cane borer. Every farmer can, if he wishes, carry out an interesting experiment to discover whether this insect has become established, or is trying to gain a footing, on his cane land. Just continue reading, and you shall learn how to do it.

Take about half a dozen thick juicy cane sticks, cut them into lengths of from 10 to 12 inches, and split each in half lengthwise with a cane knife. Now, lay these cut pieces on the ground side by side, touching each other, under a stool at the edge of a block of standing cane, and in a position affording shelter from direct sunlight. Arrange the sticks with the cut surfaces downwards, in the form of a little heap about 9 inches wide by 6 in height, and cover this over with a layer of moist trash about 3 inches thick, in order to prevent the bait-trap from drying too quickly, and secure damp, darkened, conditions. Examine this trap every second day to note the percentage of weevil borers attracted to same, which, when present, will be found under and amongst the cut sticks.

The Trapping of Beetle Borers Meets with Success.

The Chemist in Charge at the South Johnstone Sugar Experiment Station is having great success with this method of trapping beetle borers, and recently sent over 400 living specimens of this weevil to Meringa Experiment Station, to be used for breeding purposes in connection with the propagation of one of the most useful parasites of this notorious cane borer.

Growers should be able to get results similar to those mentioned above.

If ten to fifteen beetles are found in a single bait trap it will pay to lay down a dozen or more at distances of a few chains apart, in areas which may be thought likely—from previous experience—to harbour beetle borers, such as low-lying cane lands, or fields on which the cane has been partly blown over.

Scattered Cane Blocks are a Mistake.

When adding to your acreage of cane, the position of additional blocks should always be arranged as far as possible to form a direct continuation of the main existing plantation. By following out this plan the total length of headlands adjoining forest country can be reduced to a minimum, and less injury incurred from possible invasion of a cane farm from the outside by various sap-sucking and leaf-eating insects, such as grasshoppers, moth borers, leaf hoppers, &c.

Destroy the Bread Ravager of Cane-fields.

Our old enemy the "greyback" cockchafer is much in evidence just now on many cane areas, where, during seasons like the present, the sight of the extensive damage caused by its grubs must be very disheartening to those concerned.

What are you growers going to do about it? Leaving things to chance is poor policy, as the present situation calls for drastic action. Your wisest course is to make provision for combating the grubs of this pest next season.

Those intending to fumigate their cane should get into touch at once with the Entomologist at Meringa, in order that arrangements can be made in good time with the secretary of the Cairns Cane Growers' Association for the purchase of any fumigants required.

Farmers wishing to use paradichlor. will be able to purchase it at the price quoted last season—viz., £55 per ton.

Those favouring the carbon bisulphide treatment can procure this fumigant for about 38s. 6d. per drum holding 60 lb.

Destroy all Weeds Whenever Seen

It pays to Keep your Cane Land Clean.

It is necessary to impress upon growers the importance of clean cultural conditions. Never allow weeds to attain any size or to go to seed between the rows of cane, as in addition to the loss of a certain percentage of natural plant-food, and of manures that may have been applied to the soil, the mere presence of a bed of weeds serves to attract the attention of several minor cane pests, together with a variety of insects, which, after visiting the weeds and grasses, will naturally settle upon the cane, and may in time come to acquire a liking for the young heart-leaves.

The large moth borer, for instance, frequently invades such neglected plantations, the caterpillars of this pest having often been noticed destroying young shoots of plant and ratoon cane of the borders of blocks adjoining virgin forest country, and close to headlands left covered with blady grass and other weeds.

Furthermore, during the fighting or swarming period of our greyback cockchafer, a vigorous growth of vegetation between the cane rows will often induce the female beetles to deposit their eggs in such places.

FUNGI AND BACTERIA.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

A plant may be said to be diseased when, owing to some condition of its environment or due to the presence of some associated organism, it is not able to display its normal state of development. In its widest sense the term "disease" would include the results of insect depredation, but it more commonly serves to designate plant troubles of the under-mentioned types. The study of diseased conditions of this nature comes within the realm of Plant Pathology and is the work of the Plant Pathologist.

1. *Non-Parasitic or Physiological Diseases.*—These include general or local disturbances of the normal physiology of the plant owing to unsuitable environmental conditions, such as poor drainage, soil deficiencies, &c. The nature of these diseases is often obscure and in many cases the actual cause is unknown. Examples will be found in blossom-end rot of tomatoes and citrus exanthema.

2. *Parasitic Diseases.*—In this class are included diseases due to attack by members of several groups of parasitic organisms of which by far the most important are the fungi and bacteria. The great majority of diseases manifesting themselves in the form of definite lesions, such as leaf spots, fruit rots, &c., are caused by the presence of species from one or the other of these two groups.

3. *Virus Diseases.*—These are due to the presence within the plant of an infectious principle of ultra-microscopic size. Although little can be ascertained regarding the nature of the causal agent in these diseases, the members as a whole exhibit relationships which suggest that the group is a natural one. There are two well-known representatives in Queensland—bunchy top of bananas and spotted wilt of tomatoes.

FUNGI.

To understand fully the nature of a fungus or bacterial disease it is necessary to have some realisation of what the causal organisms are like in their structure and habits.

The fungi are low down in the scale of the plant kingdom. Their nearest allies are the algæ, some of which constitute the simplest forms of plant life known, while the higher forms are represented by the seaweeds. In both algæ and fungi the vegetative state takes the form essentially of a slender tubular filament or by association of several filaments a tubular structure or flat plate may be formed. The external appearance may differ widely in the various species, which sometimes superficially resemble the shape of higher plants. Growth, however, can normally take place from the ends of the filaments only and the solid structure of the higher plants with all their specialised organisation depending on cell division both parallel and at right angles to the direction of growth never occurs.

Some fungi closely resemble the algæ in both vegetative and reproductive characters and they have probably evolved from the latter

* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane.

group. One very important point of separation from the algae, and higher green plants as well, is the fact that a fungus does not possess the green colouring known as chlorophyll. By the aid of this substance plants which possess it are able to build up out of the carbon dioxide of the air and water and salts from the soil all the material necessary for their growth. Since a fungus does not possess chlorophyll it is dependent for nourishment on material already elaborated by green plants, such as is to be found in dead and decaying organic matter or in the living substance of the plant itself.

Structure.

The vegetative part of a fungus is known as mycelium, and consists of slender cylindrical thread-like filaments. (Plate 93, fig. 1A.) These are very fine and delicate, their diameter being usually somewhere in the region of $\frac{1}{1000}$ of an inch. A single thread of mycelium is known as a *hypha*. The cavity of the filament may be continuous, as, e.g., in some of the moulds, but in all the higher fungi it is divided by partitions or *septa* into a number of cells. The mycelium is composed on the outside of a thin pliable membrane which is a product of secretion of the living substance within. It is formed of a material differing somewhat from the ordinary cellulose of plant cell walls and in many cases consists rather of *chitin*—the substance going to form the shell of insects. Within the cell wall and lining it is the actual living matter of the organism. This is known as *protoplasm* and consists of a clear jelly-like substance. There is usually in each cell a small area of very highly differentiated protoplasm enclosed in a delicate membrane of its own. This body, known as the *nucleus*, is the all-important organ of the cell and controls the various growth and life manifestations of the fungus, such as assimilation and reproduction.

In a young cell the whole of the interior is filled with protoplasm, but as the cell wall expands and elongates with growth spaces known as *vacuoles* are left which become filled with watery cell sap. Reserve food material is often present in the cell usually in the form of granules of glycogen or animal starch and bright refractive globules of oil. Some fungi have colouring matter permeating the cell wall or dissolved in the oil globules. Growth of a hypha is a simple process. The terminal cell elongates. The nucleus divides and a transverse septum is laid down separating off the daughter nucleus and thus forming two cells. The new apical cell then enlarges and continues the growth as before. Branching takes place by means of a lateral extension from a cell of the hypha which takes on the function of a growing tip.

The form assumed by most of the less highly differentiated fungi in their vegetative state consists simply of a more or less interlaced mass of mycelial threads. Many of the higher forms by aggregation of hyphæ in a definite manner have produced more complex fungus bodies. The simplest of these is formed from the close interweaving, and in some cases fusion, of numbers of the hyphæ running together in a longitudinal direction. Definite fungal strands visible to the naked eye and known as *rhizomorphs* are thus produced. Sometimes the rhizomorph is differentiated into an outer thick-walled protective layer and an inner region of more delicate structure. A good example is seen in the black strands enveloping the roots of trees attacked by *Armillaria mellea*. The white strands given off from the base of mushrooms and

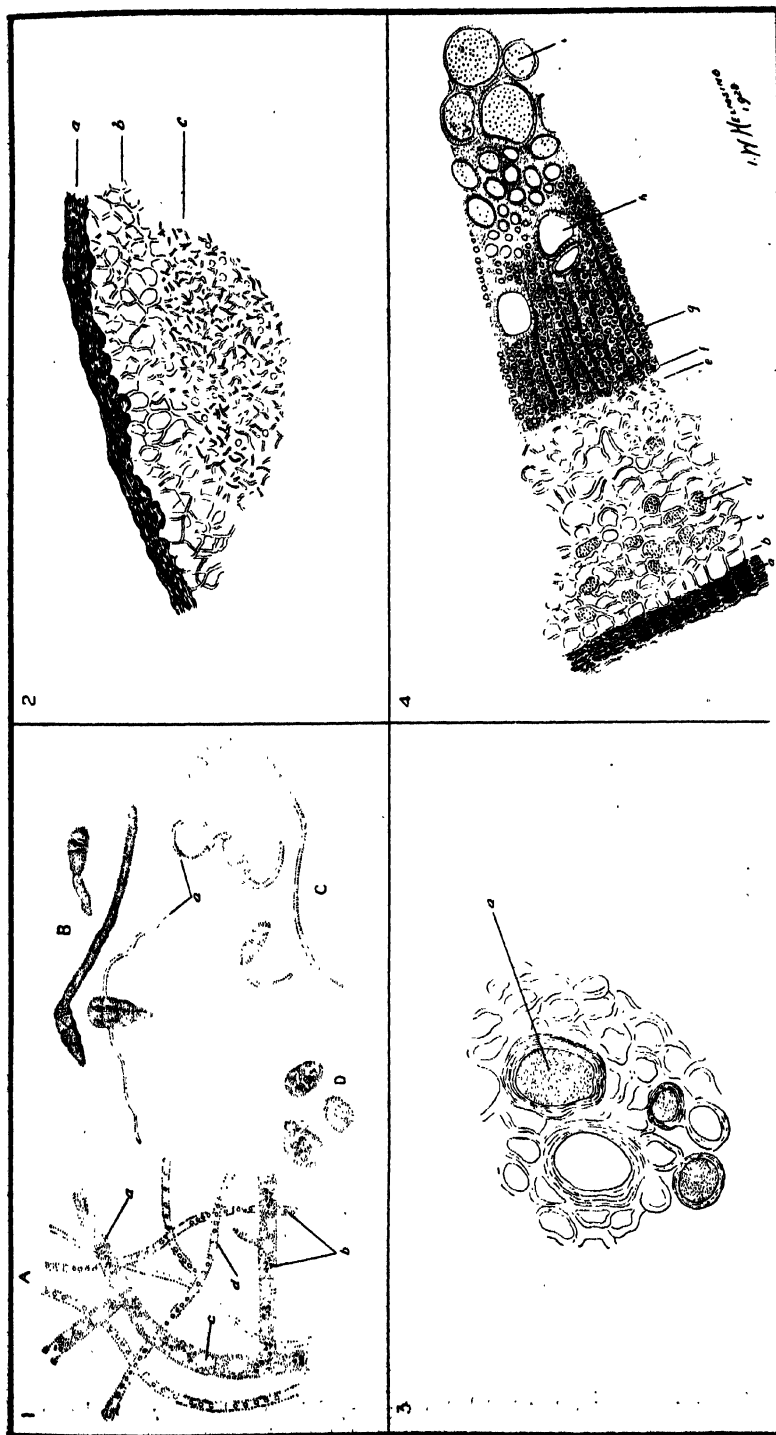


PLATE 93.—Fig. 1A, portions of fungus mycelium; a, protoplasm; b, food granules; c, vacuoles; d, septum. B and C, germinating spores; a, germ tubes. D, Zoospore formation in *Plasmopara viticola*. Fig. 2, segment of transverse section through a sclerotium of *Sclerotium rot/eti*; a, hard outer cortex; b, pseudoparenchyma; c, medulla, x 210. Fig. 3, portion of transverse section of perimmon cabbage stem showing Black Rot bacteria (*Pa. campestris*) in vessel at a, x 210. Fig. 4, segment of transverse section of perimmon shoot; a, cork; b, phellogen; c, parenchyma cells of cortex; d, starch grains; e, phloem region; f, cambium; g, xylem cells of wood; h, larger xylem vessel; i, parenchyma cells of pith, x 210.

commonly known as spawn are of a similar type. By means of these organs a fungus can travel with its delicate tissues undamaged for a considerable distance through the soil.

The mycelial aggregate may take a more compact form, giving rise to firm irregular or spherical bodies known as *sclerotia*. These, by virtue of the development of a thick resistant wall to the cells of the outer layers, can act as resting bodies and serve to enable the fungus to withstand such adverse conditions as exposure to drying. (Plate 93, fig. 2.) Reserve food material is frequently stored up within their cells. Examples of sclerotia are seen in the black irregular disc-like bodies scattered over the tubers of potatoes affected with *Rhizoctonia* Scab. The rounded form is fully described for the sclerotial fungus included under the heading of *Mycelia Sterilia*.

More complex still are the structures developed by many fungi during their reproductive stage—e.g., such as are seen in the mushroom and bracket fungi. Here by interlacing and fusion of the hyphal filaments there may be formed a many-layered cellular structure resembling in superficial appearance that found in the higher plants. Such structure is known as *pseudoparenchyma*. It is shown in its simpler development in Plate 93, fig. 2.

Reproduction.

So much for the mycelium by means of which a fungus grows over or within its host and attains food and nourishment for its development. The vegetative stage in most fungi serves as a means to one end—that being the development of a reproductive stage by means of which the organism is perpetuated from generation to generation.

In a few, reproduction takes place simply by means of broken segments of mycelium; in the majority, however, there is developed a special reproductive organ consisting of a single cell or at most a small cell aggregate known as the *spore* which corresponds in function to the seed of higher plants. Should a mature spore reach the right food material, and the temperature and moisture be suitable for development, its living contents will grow out into a slender delicate hyphal structure known as a *germ-tube*, which represents the first stage in mycelium development. With it commences once more the vegetative stage of a new fungus plant. (Plate 93, figs. 1 b, c.)

Spores are formed from the mycelium in two main ways—(1) *Endogenously*: In this case the contents of the modified mother cell known as a *sporangium*, become divided up into a number of smaller portions which may or may not develop cell walls of their own. These are finally liberated by rupture of the sporangium wall (Plate 95, fig. 1). In some cases, as e.g., in the fungus causing Irish Blight, the spores develop a fine filiform vibratile process known as *flagellum* which enables them to swim around in a film of surface moisture. Such spores are called *zoospores*. (2) *Exogenously*: Exogenous spores are produced from the ends of fertile hyphae by a process analogous to budding. The top of the hypha becomes separated off by development of a septum, and the cell so formed gradually assumes the shape of the particular spore form of the species. Often the hypha is divided into a number of segments before shedding of the spores takes place, so that a chain of spores is produced. Spores produced in an exogenous manner are called *conidia* and the fertile hyphae from which they are developed are known as *conidiophores*. (Plate 95, figs. 8, 9, 3b.)

Many fungi are *polymorphic*—i.e., they develop more than one spore form during their life cycle. (Plate 95, figs. 3, 5.) Commonly in one of these forms is represented a sexual stage. In the fungi this consists essentially in the union of the nuclei of two distinct cells either from the same or different fungal plants. The significance of this act is doubtful, though in some cases it may serve to invigorate the stock and preserve the characters of the race. The fruiting body developed in connection with the spores resulting from this act of union is usually referred to as the *perfect stage* of the fungus. Other methods of spore formation occurring in conjunction with a sexual stage are usually various modifications of the exogenous or endogenous types mentioned above. In the case of the occurrence of the former type the stage is usually referred to as the *conidial stage*.

The actual details of spore formation and the various supporting structures developed in connection with the process vary greatly in the different groups into which the fungi are divided, the groups themselves being largely established on consideration of the reproductive characters.

A description of some of the more characteristic types will be found in the chapter dealing with the classification of fungi.

BACTERIA.

The bacteria rank next in importance to the fungi as causal agents of plant diseases. At one time they were considered to be parasites only of animals—a view since shown to be quite erroneous by the discovery of members of this group acting as the causal agents in many serious plant troubles. The bacteria are usually attached to the true fungi or Eumycetes as a separate division known as the Schizomycetes or fission-fungi. They resemble fungi to a large extent in their general habits, though differing from them morphologically, being of simpler construction.

Bacteria appear as spherical or rod-shaped cells of extremely minute size. A quite average specimen might have a diameter of less than $\frac{1}{1000}$ of an inch. (Plate 93, fig. 3a.) The cell is bounded by a thin elastic outer wall or capsule within which lies the living protoplasm. From the wall of the capsule may extend one or more vibratile filaments known as *flagella*, which confer the power of motion on the species possessing them. The flagella may be polar or diffusely scattered. As in the case of fungi, there is no chlorophyll developed. Numerous granules may be imbedded in the protoplasm, but a definite nucleus such as is found in the fungi and all the higher plants appears to be absent.

One of the chief differences between the fungi and bacteria is in their manner of growth and reproduction. In the former growth is continuous from the apex of a hypha and reproduction takes place by the use of a specialised spore. The bacterial cell has no apical growth. A slight extension takes place and then the individual divides into two by simple fission. The two cells may separate and become independent, or they may remain more or less loosely associated end to end when by frequent division of each cell a chain of individuals is formed. Successive division may take place after intervals of half to one hour. At this rate the progeny of a single cell may in twenty-four hours amount to many millions. Fortunately, lack of suitable food material or environment and the toxic action of their own secretion helps to keep the

number down. A resting spore is formed by some bacteria. A portion of the protoplasm in a mother cell becomes somewhat denser, and round this is developed a special wall to form the spore. This appears as an ovoid refractive body lying within the mother cell. These spores are highly resistant to adverse conditions and can germinate readily after being subject to conditions fatal to the ordinary vegetative cell.

Most of the plant pathogens belong to the rod-shaped type. Of these the chief genera are *Bacterium*—non-flagellate; *Bacillus*—flagellate with flagella diffusely scattered; *Pseudomonas*—flagellate with polar flagella.

MYXOMYCETES.

This primitive group of slime fungi are often associated with the Eumycetes and Schizomycetes as a third division, the Myxomycetes, under the term Fungi, using this name in a broad sense. The three divisions resemble each other in the absence of chlorophyll and certain characters resulting from this. The slime moulds constitute the lowest form of plant life, living as they do on the border line between plants and animals. They are unprotected in their vegetative state by a cell wall, and consist of a naked mass of jelly-like protoplasm. Most forms are saprophytes. One is the cause of the well-known Club Root of cabbage. None of the slime moulds are responsible for serious disease in this State.

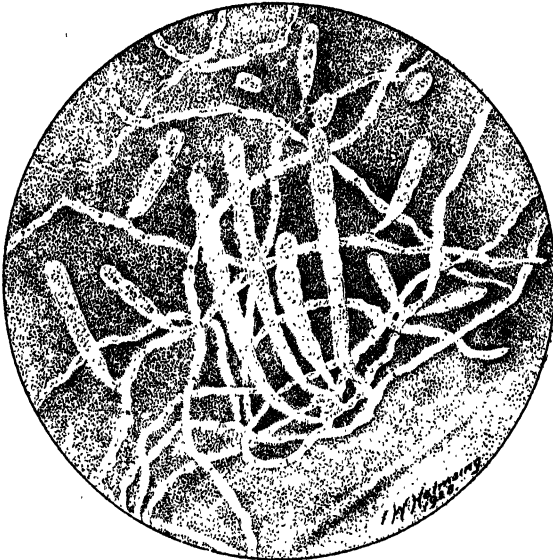
HABITS OF FUNGI AND BACTERIA WITH SPECIAL REFERENCE TO THE HOST PLANT.

To understand the effects a fungus may have on its host it is necessary to form some idea on the general structure of the flowering plants. It is therefore proposed to give here a brief outline of this subject.

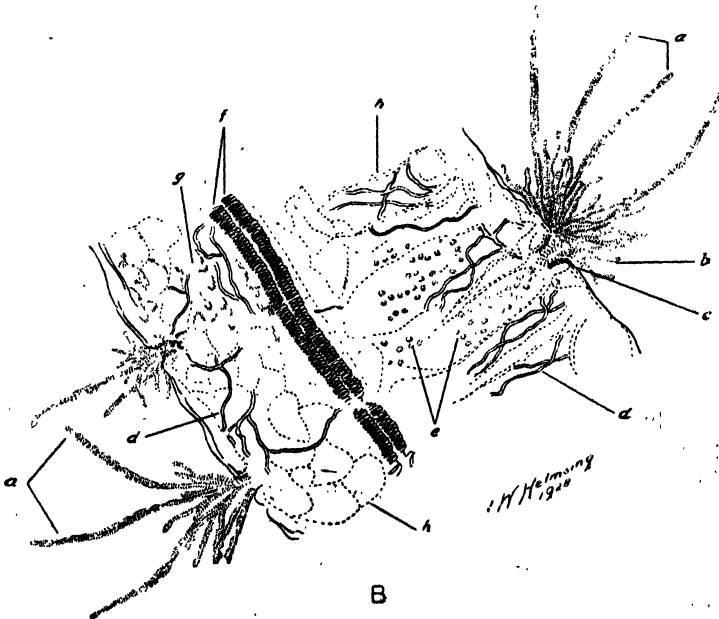
Structure of the Host Plant.

On general appearance a plant is at once seen to consist of roots, stem, and leaves, and with each of these is associated differences in structure and function. The roots serve to anchor the plant to its substratum and act as the absorbing organs for obtaining the water and mineral salts necessary for nourishment and for maintaining turgidity. If there is not sufficient water available to fill and distend the cells and thus confer a state of rigidity even on soft tissue, sagging and wilting will occur. The trunk and branches serve for support and display of the leaves and provide channels of communication between these organs and the roots. The leaves are the site of the elaboration of the various food constituents for which they serve as the receiving depôt. By means of the complex green colouring matter known as *chlorophyll* which is present in them, leaves are able to make use of the sun's light energy and by its aid absorb the carbon dioxide from the air and combine it with the water and mineral salts obtained from the soil by the roots. The first products of this chemical action are simple, but there is finally built up from these all the complex organic compounds which go to make up specialised plant structure.

The whole of the plant body, like that of the animal, is composed of a collection of minute cells. A plant cell differs from that of an animal in that it is provided with a wall of cellulose to which the rigidity of the plant structure is due. The individual cells are box-like or oblong



A



B

PLATE 94.

Fig. A.—The ectoparasitic type of fungus. *Oidium erysiphoides* as it appears on the surface of a marrow leaf infected with Powdery Mildew, x 210.

Fig. B.—The endoparasitic type. Section of leaf of the nightshade (*Solanum nigrum*) attacked by the fungus *Cercospora solanacea*; a, spores; b, conidiophores; c, stomata of the leaf; d, mycelium of the fungus; e, chloroplasts in cells not yet invaded; f, conducting vessels of vascular bundle; g, tissue disintegrating as result of fungus attack; h, cell walls, x 210.

and in general resemble the fungal cells described above. The cells of the leaf and other green parts contain embedded in the protoplasm, in addition to the nucleus and various food granules, small disk-like bodies known as *chloroplasts*. (Plate 94b.) These contain a fatty substance in which is dissolved green colouring matter—chlorophyll—on which as it has been shown the life processes of the plant depend. The higher plants differ from the fungi and algae in that their cells have the power of dividing by walls parallel as well as at right angles to the direction of growth so that more solid structures can be produced. Young tissue consists of a mass of closely packed oblong cells, but as these distend somewhat with growth the walls separate slightly at the edges and minute intercellular spaces appear. It is by means of these spaces that the air reaches throughout the tissue, bringing with it the oxygen used in respiration. Should air be prevented access to any part such as by waterlogging of roots, &c., asphyxiation is likely to occur. In the plant there is nothing corresponding to the complex blood system of the animal which distributes throughout the whole body the oxygen on which life depends. Thus every cell of the plant must come in contact with air and breathe for itself.

The outer surface of a plant, at least in its young stages, is covered by a protective layer of cells known as the *epidermis*. This consists of a single layer of closely united cells whose outer wall is thickened by the deposition of corky or waxy substances which serve to prevent excessive loss of moisture and also protect the plant from invasion by parasitic organisms. At frequent intervals, especially on the under surface of leaves, minute funnel-like pores or *stomata* occur in the epidermis of the aerial parts through which air circulates to the inner tissue. (Plate 94b.) The stomata are rather a point of weakness in times of fungal or bacterial attack, as organisms, unable to penetrate the protective epidermis are often able to gain entrance by their means. On the young fibrous roots very thin-walled tubular extensions of the epidermal cells act as the absorbing organs through which the desired soil solutions percolate. They are known as the *root hairs*. The delicate nature of these is sometimes made use of by soil-frequenting parasites which find in them an easy path to the inner tissues of the root. Developments from the epidermal cells of aerial parts may result in producing hairs, scales, &c.

In the branch and root of woody plants the epidermis later becomes replaced by a more substantial protective covering. A ring of cells lying just below the epidermis takes on the power of active division and is known as the *phellogen*. These cells divide by walls laid down parallel to the external surface and form a layer of closely-fitting oblong cells built up somewhat like bricks in a wall. The cells of this layer become impregnated with a corky material which with their tightly packed arrangement makes them specially suitable to resist adverse conditions of the environment and the attack of parasites. (Plate 93, figs. 4 a, b.) It is this layer, known as the *cork*, which makes many of the fungi attacking woody tissues dependent on wounds for their entrance. The cork, together with some of the underlying tissue, is that part of a tree to which the common name of bark is applied. After cork formation the place of the stomata is taken by patches of loosely packed cork cells through which the air is able to penetrate. Apart from the bark *phellogen* it is not usually normal for mature cells to take on the function of active division. However, this does occur in the case of wounds or

an invasion by parasites. A layer of contiguous cells surrounding the affected region assumes the function of a phellogen and deposits a protective layer of cork which cuts off the injured from the healthy tissue. The lesions of many fungi are definitely restricted in extent by a deposition of cork in front of their line of advance.

The radial growth of the stem and roots of the larger plants is due to the action of a ring of actively dividing cells having its origin in the growing point and extending back in the shape of a thin hollow cylinder situated some distance further in than the phellogen layer. This tissue in which active cell multiplication takes place is known as the *cambium*. From it are cut off on the side towards the centre of the stem cells which eventually become large cylindrical vessels, the walls of which become thickened and strengthened by a substance known as *lignin*. These cells in mass form what is commonly known as the wood and botanically as *xylem*. (Plate 93, fig. 4 c, f, g, h.) Besides lending support to soft tissue the xylem vessels serve as conducting tubes which convey water and dissolved salts from the roots to be used in the leaves. On the outer side of the cambium, cells divide to form a smaller number of narrow elongated cells known as *phloem* tubes, through which the food material elaborated in the leaves is conducted to other parts of the plant needing it. In some annuals and young plants the cambium may not be developed in a complete ring, in which case smaller patches of xylem vessels, cambium, and phloem, known as *vascular bundles*, form isolated woody strands running down the branch. Surrounding these and separating them from each other is a loose tissue composed of round or oblong thin-walled cells known as *parenchyma*. Parenchyma separates the phellogen and cork from the vascular tissue, and when present in the centre of the stem forms the pith. (Plate 93, fig. 4 c, i.) In the leaf, extensions of the vascular bundles of the branch form the veins. (Plate 94B, f.) Here the interlying parenchyma is particularly loose in arrangement so as to facilitate circulation of air amongst the chlorophyll containing cells and thus permit of ready assimilation.

Anyone wishing to go further into the subject of plant structure and physiology should provide themselves with "An Elementary Text-book of Forest Botany," by C. T. White, F.L.S.

Saprophytes and Parasites.

As mentioned elsewhere, one of the essential points of difference between the fungi and bacteria and the rest of the plant kingdom is the normal absence of chlorophyll. As this green pigment is a chemical necessary for the manufacture of the carbon compounds out of which is built the great bulk of the structure of plant life, it follows that the fungi and other forms lacking chlorophyll have to fall back on the higher green plants or organic products derived from these for their supply of carbonaceous material. A little thought will show that the animal kingdom is also ultimately dependent on green plants for its food supply.

With reference to their method of obtaining a supply of organic food, the fungi and bacteria can be divided into two main groups.

(1) *Saprophytes*.—Under this term are included all the multitude of organisms that live on dead plant remains. These they break down into carbon dioxide, ammonia, and simple mineral salts suitable for absorption again by the roots of green plants, assimilating at the same

time substances suitable for their own nourishment. The saprophytes act as scavengers, and play a very important part in the economy of nature by preventing the excessive accumulation of waste material, which they place in a condition suitable for use again.

(2) *Parasites*.—As parasites are included all those organisms which are able to attack and obtain their nourishment at the expense of living plants and animals. This group includes all those fungi and bacteria causing definite plant disease.

The two groups are not clear cut. Sometimes an organism normally a saprophyte may invade and produce disease in a plant whose vitality is low on account of subjection to poor growing conditions or other detrimental agencies. These are known as *hemi-saprophytes*, as distinct from *true saprophytes*, which cannot attack a living host. Examples are seen in certain root rot producing organisms. Others, although capable of true parasitism, are able to live for a time on decomposing organic matter in the soil, and from there pass to a living plant should it come in contact with a suitable host. Organisms of this nature are known as *hemi-parasites*. Many species of *Fusarium* and *Rhizoctonia* causing crown and root trouble are of this type. The rusts and smuts are examples of the *true parasites* depending entirely on a living plant for their support.

Some weak parasites are only able to enter their host by means of wounds which rupture the normally resistant bark and expose the more delicate living tissue below. Some may even start as saprophytes on the dead tissue of the wound, and from there pass into the healthy region. Examples of these types may be had from the fungi responsible for collar rot in citrus, and in many of the organisms attacking the woody parts of plants.

Some fungal parasites choose a member of the animal kingdom for their host. A few of these are parasitic on man and the higher animals. Others serve a useful purpose, since they attack and destroy many of the scale and other insect pests, over which in a wet season they may exercise considerable control. The fruiting stage of these *entomogenous* fungi can be seen as a white or reddish tuft protruding out from beneath the covering of the dead scale.

Ectoparasites and Endoparasites.

The parasitic fungi can be divided into two groups with respect to their method of living on their host. These are the *ectoparasites* and *endoparasites*, a grouping which is of considerable importance when control measures are being considered.

Ectoparasites are those fungi whose mycelial growth is out on the external surface of their host plant, where it forms patches of fine web-like covering. (Plate 94, fig. A.) From the hyphæ in contact with the epidermal cells short lateral peg-like branches are given off which penetrate the cells of the outer tissue layers, and from them absorb all necessary nourishment. The absorbing organs are known as *haustoria*. The Erysiphaceæ or powdery mildews are a large group of important plant parasites whose habits are of an ectoparasitic nature. This enables them to be effectively controlled by application of sulphur and sulphur compounds in the form of a dust or wet spray. Certain of the fumes given off by the sulphur cause the death of the superficial fungus mycelium without injuring the plant.

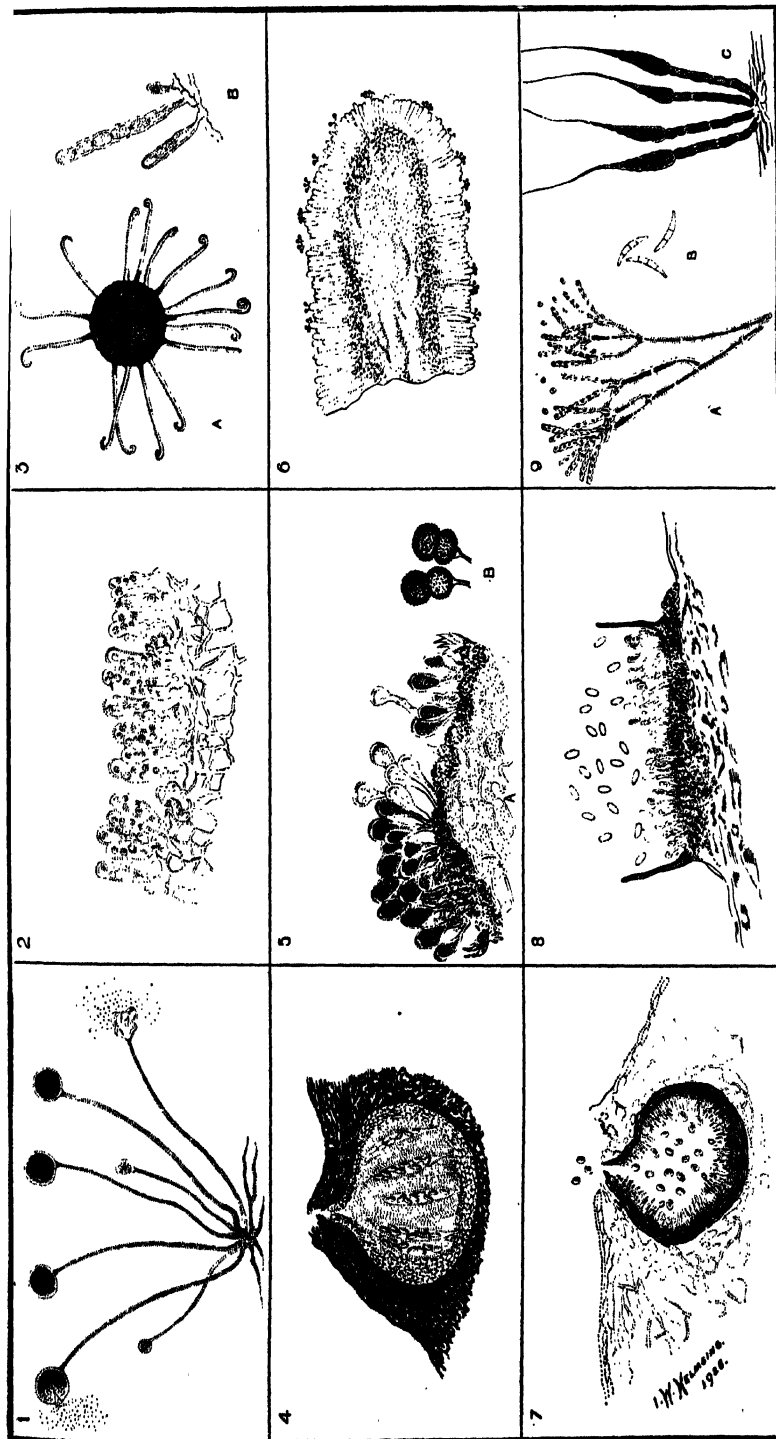


PLATE 95.—FRUITING BODIES OF SOME TYPICAL FUNGI.

1. *Rhizopus nigricans*. 2. Aci of *Tapirina deformans* on surface of curled peach leaf. 3. *Uncinula australiana*—A, perithecium; B, conidial stage. 4. Perithecium and asci of *Glomerella cingulata*. 5. *Puccinia prunispinosa*—A, uneciosorus on peach leaf; B, teliospores. 6. Section through the gill of a mushroom. 7. Section through orange rind showing pycnidium of *Phoma citricarpa*. 8. Section through ascervulus of *Gloeosporium lindemuthianum* on French bean. 9. A, *Penicillium expansum*; B, *Fusarium* spores; C, *Alternaria solani*. (Figures x 210.)

In *endoparasites* the spore on germination grows out into a delicate hyphal thread known as the germ-tube, which penetrates the epidermal layer by dissolving the outer cell wall, or, when not able to do this, by making its way through the stomata or breathing pore. The hypha then branches, and the mycelium spreads throughout the tissue of its host, either growing in an intercellular manner between the cell walls and sending short haustorial branches into the individual cells for food supply, or else itself penetrating both intercellular and cellular spaces in its ramifying passage through the host tissue. The final result is usually death of the tissue in the part invaded. (Plate 94, fig. B.) The dissolving of the epidermal wall by the germ-tube and the subsequent penetration of the mycelium through the cell walls of the inner tissue is accomplished by means of an enzyme secreted by the protoplasm of the growing tip, which has the power of dissolving cellulose. Some fungi and bacteria secrete a toxic substance which kills the host cells for some little distance in advance of actual hyphal growth. This in a few instances may be of a distinct advantage to the plant, as the fungus is unable to obtain the living tissue required and dies. There are parasites, such as some of the smuts and rusts, which have reached a high degree of adaptation with their host, and no actual death of the tissue or *necrosis* as it is called takes place, although the mycelium may be present throughout the cells.

When once the fungus mycelium has penetrated within the tissue of its host it becomes more or less protected from the effects of external fungicidal applications. As the plant possesses nothing corresponding to the blood system of animals whereby a poison may be carried uniformly throughout the organism, it is necessary to fall back on a spray, which, when covering the surface of the susceptible host, will kill the germ tube before it can gain entrance to the interior. For *endoparasites* a spray such as Bordeaux or Burgundy mixture therefore becomes necessary.

Effect—the Parasite and the Plant.

The reaction between the host and parasite is usually specific for the fungus or bacterium attacking and the host species attacked. There are thus formed characteristic types of injury for each disease. Much often depends on the ability which the host displays in the development of a protective corky layer around the affected region, the lesion by this means being limited to areas of definite size.

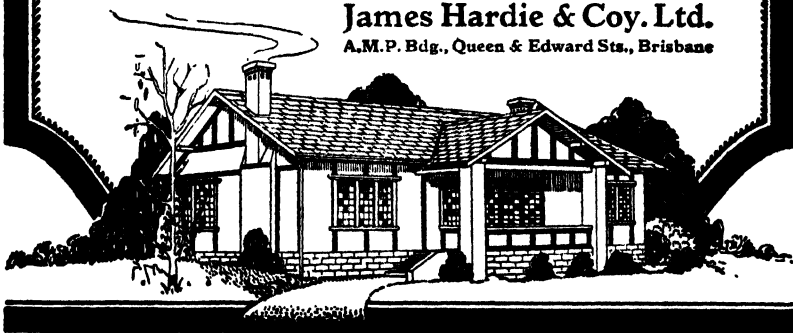
Leaf infection usually results in spots of various size, shape, and colour. The plant may cut off the affected part by a corky layer, when the centre may drop out, leaving a shot-hole condition. The attack of woody parts may result in the formation of open wounds or cankers or extensive dry rot. When juicy fruit or succulent tissue is attacked a soft rot is commonly the result, especially when bacteria are the causative agents. The attack of a soil-frequenting organism may result in root or collar rot, or the water-conducting tissue may be invaded. In this case a wilting or gradual declining of the aerial portion of the plant is often the first symptom noted. When the leaves commence to die more or less uniformly from the margin, root trouble can usually be looked for—the region furthest from the source of water supply feeling the effect first. The fungus does not always kill the tissue of the host, but may stimulate its abnormal development. This occurs in the production of such malformations as peach-leaf curl, witches' brooms, fungus and bacterial galls, &c. Abnormalities also occur as a result of restriction in normal growth.

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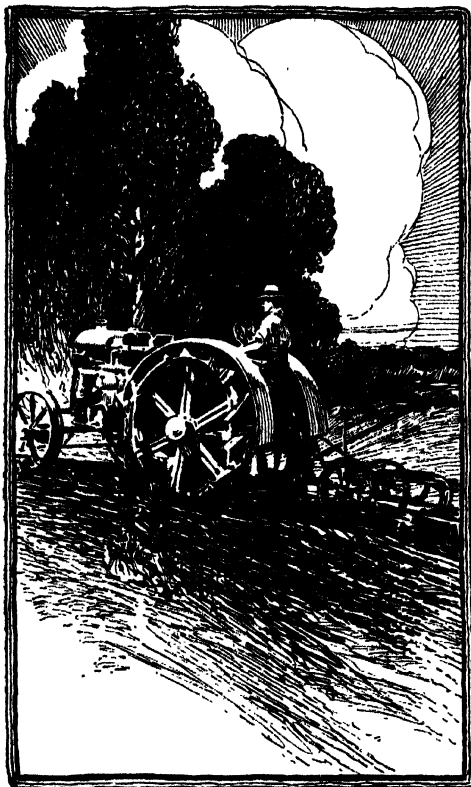
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BANANA EXPERIMENT STATIONS.**KIN KIN.**

The following progress report of the work done at the Kin Kin East Experimental Farm has been received from the Acting Manager, Mr. H. J. Freeman:—

Preparations for Planting.

The desired site of approximately 15 acres was chosen for the conducting of different experiments in connection with banana growing at Kin Kin East, and clearing was carried out satisfactorily. Favourable weather conditions continued and the fallen scrub dried quickly. On 16th November the scrub was fired and resulted in a reasonably good burn. Owing to the position of the banana plantation on the adjoining property and the prevailing wind, the fire could not be lighted as soon as desirable, and the logging-up and burning-off was commenced on 21st November. Preparations for planting were commenced at the lower end of the area and the different plots were separated by good margins. Realising the necessity on an experimental farm for a plot of land available for planting at short notice, an area of approximately 3½ acres along the western boundary of the clearing was reserved and planted with a cover crop of beans (velvet and soya varieties). It would be quite possible to convert this land into a cultivated experimental plot at very short notice, whereas, if scrub had to be felled, months would elapse before such ground would be ready for planting.

Altogether 4,820 bananas have been planted and these include six varieties. Satisfactory growth has been made since planting, especially in the case of the Gros Michel variety.

Experiments Conducted.

Experiments in steeping (dipping in different solutions for given periods), spacing, depth of planting, trimming, and fertilising have been conducted and baiting beetle borers has also received attention.

Slide tracks have been made and a carrying wire and windlass system have been erected. The building area has been securely fenced and preparations have been made for the fencing off of the whole cleared area. Excessive rain caused serious delay, and created a heavy weed growth, but the property throughout has been kept clean by several chippings. An experiment with weed-killing spray was also carried out on a small area of land.

BARTLE FRERE.

The following report on the work performed at the Experimental Farm, Bartle Frere, has been received from Mr. W. J. Ross, Assistant Instructor in Fruit Culture, Cairns:—

Weather.

For the quarter ended 31st March the rainfall at Cairns was 84.67 inches and although no records are available for Bartle Frere, it is thought that the rainfall there was a little heavier. The excessively wet conditions did not help to expedite the work on the Experimental Station, and it was fortunate that a "burn-off" of the felled area had been previously effected.

Fencing.

A four-wire—2 barb, 2 plain—fence with a gateway in the centre has been erected along the front boundary of the recently felled and burnt area of 10 acres. Temporary barb wires will be run along the edge of the scrub on the south side in order to prevent cattle entering the area after it has been planted. It has been decided to erect a temporary bush hut for the purpose of accommodating tools and other materials on the farm. Dipping tank, mattocks, axes, shovels, and other necessary tools have been procured and are ready for use at the Experimental Station.

Planting.

Ten acres are ready for planting and as soon as plants are available this work will be proceeded with. A further 2 acres, which are to be planted according to American system, are at present being bushed, and this area will be ready for planting on completion of the planting of the 10-acre area. It is proposed to plant 1 acre of Gros Michels in bushed area at 18 feet apart; also 1 acre in the 10-acre area at 15 feet apart. Over 300 plants will be required for this purpose. It is learnt that clean plants of the Gros Michel variety are procurable in the Kennedy district.

QUEENSLAND SHOW DATES, 1929.

The following is the official list of Queensland Show Dates for 1929, as issued by the Queensland Chamber of Agricultural Societies:—

Charleville: 1st and 2nd May.
 Taroom: 6th and 7th May.
 Kingaroy: 2nd to 4th May.
 Beaudesert: 1st to 4th May.
 Mitchell: 8th and 9th May.
 Boonah: 8th and 9th May.
 Wondai: 9th to 11th May.
 Mundubbera: 8th and 9th May.
 Blackall: 7th to 9th May.
 Ipswich: 14th to 18th May.
 Roma: 14th and 15th May.
 Springsure: 15th and 16th May.
 Murgon: 16th to 18th May.
 Gayndah: 15th and 16th May.
 Goomeri: 21st and 22nd May.
 Wallumbilla: 21st and 22nd May.
 Biggenden: 23rd and 24th May.
 Emerald: 23rd and 24th May.
 Toogoolawah: 24th and 25th May.
 Maryborough: 28th to 30th May.
 Marburg: 3rd June.
 Childers: 4th and 5th June.
 Lowood: 7th and 8th June.
 Gin Gin: 6th to 8th June.
 Wowan: 13th and 14th June.

Bundaberg: 13th to 15th June.
 Bororen: 17th and 18th June.
 Gatton: 19th and 20th June.
 Gladstone: 19th and 20th June.
 Mount Larcom: 21st and 22nd June.
 Buderim Mountain: 22nd June.
 Rockhampton: 26th to 29th June.
 Esk: 28th and 29th June.
 Kileoy: 4th and 5th July.
 Townsville: 9th to 11th July.
 Home Hill: 12th and 13th July.
 Samford: 12th and 13th July.
 Caboolture: 18th and 19th July.
 Ingham: 19th and 20th July.
 Rosewood: 19th and 20th July.
 Laidley: 24th and 25th July.
 Nambour: 24th and 25th July.
 Bowen: 31st July and 1st August.
 Maleny: 31st July and 1st August.
 Nundah: 3rd August.
 Royal National: 12th to 17th August.
 Goombungee: 30th August.
 Malanda: 18th to 19th September.
 Beenleigh: 27th and 28th September.

WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

CASSIA LAEVIGATA WILLD. (AN ARSENIC BUSH).

Description.—An erect glabrous shrub of 5-6 feet. Leaves composed of 3-4 pairs of leaflets, rhachis channelled above and with a prominent oblong upright gland between each pair of leaflets. Leaflets ovate-lanceolate, rounded at the base, and light or dark green above according to situation; much paler (glaucous) below, varying in size but averaging about $2\frac{1}{2}$ inches long and 1 inch wide. Flowers bright yellow, about 1 inch across when fully opened, borne in terminal or axillary corymbose racemes. Sepals light greenish yellow, unequal in size, the largest ones about 5 lines long. Petals deep bright yellow about 8 lines long. Stamens 10, 3 perfect, 2 on longer and 1 on a short filament, 7 small and sterile. Ovary green, curved, sessile. Pods cylindrical, usually about $3\frac{1}{2}$ inches long; seeds numerous, flattened, about $\frac{1}{4}$ inch long, brown and shining, horizontally placed and separated by horizontal partitions.

Distribution.—A native of tropical America, now distributed as a weed in most tropical and sub-tropical countries, very abundant in Queensland.

Common Name.—In Queensland most commonly known as Arsenic Bush, a name originally applied to one or two species of yellow-flowered *Hibbertias* in North Queensland, now more commonly given to several species of *Cassia*, particularly the present one and *C. Sophera* var. *schinifolia*.

Botanical Name.—Latin *Cassia* (Gr. *Kasiz* or *Kassia*), a tree or shrub with an aromatic bark; *laevigata*, Latin meaning smooth as if polished, referring to the leaves and branchlets.

Properties.—Its local name would lead me to suppose the plant very poisonous, but I have never heard of deaths of stock from it. It is rarely touched by them, but if eaten in any quantity at all would no doubt act as a purge. Senna leaves of commerce are the product of several species of the genus *Cassia*.

Eradication.—Cutting off below the surface of the ground is most satisfactory in small areas. On large areas arsenical sprays might be employed. The weed is rather one of "scrub" rain-forest edges, along road-sides, &c., than of cultivated land or established pastures.

Botanical References.—*Cassia laevigata* Willd., Enum, Hort. Berol 441.1813.



PLATE 96.—*Cassia levigata* (An "Arsenic Bush").

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING MARCH, 1929 AND 1928, FOR COMPARISON.

| Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | | Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | |
|-------------------------|-------------------|------------------------|-----------------|-------------|----------------------------------|-------------------|------------------------|-----------------|-------------|
| | Mar. | No. of Years' Records. | Mar., 1929. | Mar., 1928. | | Mar. | No. of Years' Records. | Mar., 1929. | Mar., 1928. |
| <i>North Coast.</i> | | | | | <i>South Coast—continued:</i> | | | | |
| Atherton ... | In. 8.98 | 27 | In. 8.87 | 7.69 | Nambour ... | In. 9.60 | 32 | In. 7.57 | 3.58 |
| Cairns ... | 17.88 | 46 | 29.66 | 21.83 | Nanango ... | 3.58 | 46 | 2.84 | 0.50 |
| Cockwell ... | 16.11 | 56 | 25.84 | 9.76 | Rockhampton ... | 4.74 | 41 | 3.67 | 2.92 |
| Cooktown ... | 15.23 | 52 | 16.39 | 24.78 | Woodford ... | 8.22 | 41 | 7.72 | 2.34 |
| Herberton ... | 8.12 | 41 | 10.45 | 6.74 | | | | | |
| Ingham ... | 15.58 | 36 | 26.41 | 6.89 | <i>Darling Downs.</i> | | | | |
| Innisfail ... | 26.20 | 47 | 26.46 | 34.50 | Dalby ... | 2.77 | 58 | 4.10 | 1.28 |
| Mossman ... | 17.56 | 15 | 19.93 | 15.47 | Emu Vale ... | 2.49 | 32 | 4.12 | 1.56 |
| Townsville ... | 7.53 | 57 | 9.91 | 7.16 | Jimbour ... | 2.64 | 40 | 3.05 | 1.11 |
| <i>Central Coast.</i> | | | | | Miles ... | 2.75 | 43 | 4.23 | 0.46 |
| Ayr ... | 6.69 | 41 | 16.66 | 5.84 | Stanthorpe ... | 2.70 | 55 | 3.82 | 1.86 |
| Bowen ... | 5.68 | 57 | 7.41 | 14.36 | Toowoomba ... | 3.85 | 56 | 5.65 | 1.61 |
| Charters Towers ... | 3.66 | 46 | 7.61 | 12.15 | Warwick ... | 2.57 | 63 | 4.34 | 1.10 |
| Mackay ... | 12.22 | 57 | 11.74 | 23.19 | | | | | |
| Proserpine ... | 12.36 | 25 | 15.19 | 17.13 | <i>Maranoa.</i> | | | | |
| St. Lawrence ... | 5.61 | 57 | 1.98 | 4.77 | Roma ... | 2.70 | 54 | 2.57 | 0.78 |
| <i>South Coast.</i> | | | | | | | | | |
| Biggenden ... | 4.08 | 29 | 2.02 | 1.78 | <i>State Farms, &c.</i> | | | | |
| Bundaberg ... | 5.42 | 45 | 2.49 | 0.93 | Bungewongorai ... | 1.65 | 14 | 2.23 | 0.76 |
| Brisbane ... | 5.75 | 78 | 6.59 | 2.14 | Gatton College ... | 3.28 | 29 | 4.15 | 1.44 |
| Caboolture ... | 7.81 | 41 | 8.53 | 2.44 | Gindie ... | 2.67 | 29 | 2.42 | 1.95 |
| Childers ... | 4.80 | 33 | 3.02 | 2.07 | Hermitage ... | 2.26 | 22 | ... | 0.88 |
| Oroahamurst ... | 11.76 | 36 | 7.36 | 3.15 | Kairi ... | 8.32 | 14 | 7.88 | 10.16 |
| Eak ... | 4.91 | 41 | 9.53 | 2.63 | Sugar Experiment Station, Mackay | 11.13 | 31 | 12.17 | 22.52 |
| Gayndah ... | 3.19 | 57 | 1.06 | 0.32 | Warren ... | 2.66 | 14 | ... | ... |
| Gympie ... | 6.40 | 58 | 4.18 | 2.13 | | | | | |
| Kilkivan ... | 4.05 | 49 | 1.22 | 1.37 | | | | | |
| Maryborough ... | 6.22 | 56 | 2.50 | 2.79 | | | | | |

18th April, 1929.

GEORGE G. BOND,
Divisional Meteorologist.

QUEENSLAND RAIN FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Scrub Box is a large tree of the coastal scrubs and rain forests. It is often absent from the interior of the very luxuriant rain forests or scrubs of Queensland. In these heavy forests it is mostly found on or near the margins. It is also common in the open Eucalyptus forests. The species is known in botanical terminology as *Tristania conferta*. It is sometimes called Brisbane Box and Brush Box. The bark on the lower part of the stem is brown or grey and somewhat rough and persistent. The upper part of the stem and the upper part or the whole of the branches have a smooth brownish bark. The trees in moist places often attain a large size, reaching 160 feet in height and 7 or 8 feet in stem diameter. The wood is fairly hard, heavy, and finely grained. It is brown in colour. When seasoned it should be useful for building work in which it does not come in contact with the soil. The species is found as far south as Port Stephens in New South Wales (J. H. Maiden) and as far north as the Burdekin River in Queensland (Bentham). It is also recorded from Port Darwin by Bentham.



Photo.: W. D. Francis.]

PLATE 97.—A LARGE SCRUB BOX (*Tristania conferta*) IN THE RAIN FOREST ON
ROBERTS PLATEAU, MACPHERSON RANGE.



Photo. : Dept. Agriculture and Stock.]

PLATE 98.—SCRUB BOX (*Tristania conferta*).

A, flowering shoot; B, shoot bearing empty capsules. The long staminal bundles are conspicuous in the flowers.

FARMERS' ORGANISATIONS.

J. F. F. REID, Editor of Publications.*

Probably there are no more overworked words in the language than organisation, co-operation, and co-ordination when used in relation to agricultural questions. In none of them is there anything magical. The application of the principles they imply means solid hard work, and the use of plain, ordinary, common horse sense. The great danger of co-operative enterprises and organisation schemes lies in the risk of their getting into the control of a hidebound bureaucracy, but that can only happen where those primarily concerned become too apathetic (lazy is the better word), to watch and safeguard their own industrial interests. We all know of undertakings that have been co-operated and organised out of existence, undertakings in which all effort has been put into organisation and none into the real business, with inevitably disastrous results. Even in private enterprise we have known commercial ventures so systematised that all the time of their staffs has been taken up in working the system, and none given to working the business. Farmers, through their own apathy, are not quite blameless for any failure that may attend efforts to organise their industry. Obviously no Government can do for an industry, or an individual, what they should do for themselves. All that a Government may do is to simply supply us with the machinery and the authority, and leave the rest to our own initiative, intelligence, influence, energy, capacity, and ability.

A Road for Men.

I want to suggest that the progress which marks successful agricultural organisation in Australia to-day was not along a pleasant, bitumen-surfaced road, like the road to Redcliffe (or the road to Toowong!) but along a road on which hardship and difficulty were encountered at every turn, a road on which it was almost impossible to straddle deeply-worn ruts. It was not a track for sheep, but a road, the successful traversing of which called, and still calls, for the future towards which it is clearly blazed—for the strength of men to travel.

The Farmer as an Economic Shock Absorber.

In every State in Australia to-day, there are farmers' organisations that are real live bodies with hearts pumping and arteries pulsating with good red blood. No longer, it is evident, is the farmer, whether of Queensland or Victoria, content to be the wood and water "joey" of the Nation, or to be regarded merely as a sort of convenient economic shock absorber for the kings of commerce in the overgrown coastal cities. Each State has now in operation a more or less official scheme of organisation from which definitely good results are being obtained by the agricultural community in the shape of social wellbeing and economic advancement. Developments in rural organisation in Queensland have been discussed before in the course of these talks, and are probably familiar to us all; therefore, it will be more interesting at the moment, perhaps, if we consider what some other States are doing in the way of improving the amenities of country life within the Commonwealth.

A Southern Example.

For a start we will take South Australia, the great grain-growing State, where everybody blesses the name of Farrer—the deservedly famous Australian breeder of Federation wheat. Down there, probably the most important of rural organisations is the Agricultural Bureau, an association of practical working farmers, in effective, though by no means tape-tied (nor tongue-tied) relationship with the State Agricultural Department. I was down there scouting round "on the wallaby track" some little time ago, and had an opportunity of seeing for myself in a necessarily limited field, of course, this Bureau at work, and it impressed one as being altogether based upon a very sound system. It provides the point of contact between the farmer on the one hand, and the expert officers of the Department on the other. It is accepted as the principal channel through which the Department of Agriculture may distribute knowledge gained in the course of its research and investigational work on the experimental farms, in field plots, and in the laboratories.

Down there the common difficulty was experienced of interesting farmers in the work of research institutions, which had been equipped and staffed at great expense. Through the work of the Bureau this difficulty has been largely overcome, and its

* From a radio lecture through 4QG.

services as an institution for extension and educational work, are widely recognised and appreciated.

The Bureau, which has branches in every rural district, provides organised centres from which every farmer in the State can be reached, and so when occasion arises it is possible to establish contact with the farmers of a district in a body: an economical and efficient method when compared with the waste of time and effort involved in an individual canvass. And, because of this fact, it enables a relatively small technical staff to accomplish much more than it could were there no such organisation in existence.

Departmental Outposts.

The branches of the Bureau are, in practice, really live and alert outposts of the Department in rural districts. The co-operation of the branches is sought in every way possible, in the arrangement of tours of duty for technical officers, in the planning and conduct of experimental tests, and in the collection of data on local agricultural matters. Through the Bureau advice on all problems affecting stock and crops, in health and disease, is readily available to farmers. They are encouraged as individuals or as bodies to visit departmental experiment farms and demonstration and experimental plots. Through the Bureau mutual understanding and respect between official and farmer are cordially cultivated.

In the process of its development a tendency of the Bureau has been to concentrate into hands especially trained to treat them, many of the problems, the solution of which is dependent on special knowledge and sustained inquiry.

Coincidentally, it has served to stress the importance of some organisation which provides, among other utilities, an effective educational means in respect to field and technical working plans and policies.

Administration.

The administration of the Bureau is controlled by an advisory Board of Agriculture which is appointed by the Minister for Agriculture. Each year representatives of Bureau branches meet in congress in the capital. To enable branches to be represented at the congress the Government provides transport, without charge, for two delegates, and in many ways contributes materially to the success of what is really an annual Farmers' Parliament.

In addition to the annual congress, country conferences are held in different centres. The constitution, rules, and regulations are simple, elastic, and in no respect irksome.

Among other ways in which the Government, through the Department of Agriculture, assists local branches of the Bureau is by providing stationery and official postage, a copy of the State Journal of Agriculture to each member, and the services of expert officers as lecturers and advisers. Among the practical activities of the Bureau are the conducting of district pruning competitions, farm crop and cultivation competitions, field trials, a winter school for farmers, a Bureau library, and a reference library.

A Women's Auxiliary.

A women's auxiliary, in the form of women's branches of the Agricultural Bureau, has also been established with excellent results. The underlying principle of the Women's Auxiliary is plain. When it is recognised that on the majority of South Australian farms, the poultry yard, the dairy, and the fruit and flower gardens are at least as much the care of the woman as of the man, it must be realised that to restrict the advantages of the Agricultural Bureau to one sex is to hamper unnecessarily the development of these industries. The frequency with which application was being made by women for admission to membership of existing Branches of the Bureau was sufficient to indicate that women were not unmindful of the advantages that the Bureau would afford them, particularly if concurrently with instruction in those aspects of agriculture referred to above they could be given opportunities of acquainting themselves with the principles of home economics; and it seemed reasonable to suppose that the system which for over thirty years had proved successful in so far as the farmer was concerned, was unlikely to fail in the case of the farm woman.

Help for the farm woman, both from the viewpoint of those branches of agriculture in which she was interested, and from the viewpoint of her domestic

responsibilities, was the objective, and the experience of several years suggests that the Women's Agricultural Bureau can and will perform a most valuable service in rural districts.

At each branch meeting common field problems and rural questions generally are discussed, either in debate or by means of contributed papers, and this has proved a particularly effective form of agricultural education.

From what I could see in every State, however, in rural organisation, Queensland is still in the lead, particularly as regards her pooling legislation, commodity boards, travelling technical schools, dental clinics, baby clinics, maternity wards, postal instruction, and rural schools, besides other valuable and important auxiliary services such as the Queensland Ambulance Transport Brigade (one of the most efficient systems in the world), and that provided by the Country Women's Association and other organisations, religious, educational, and social, that are doing so much to help us in the attainment of a complete national life.

LEGUMES—THEIR IMPORTANCE.

Every farmer is now familiar with the group of plants known as legumes (so called because their "fruit" which contains the seeds is a legume or pod). These plants are of the highest value and possess characteristics that distinguish them from all others, notably the high protein content of their seed, the excellent feeding value of their whole vegetative system, and their capacity for storing nitrogen in their roots and thereby leaving the soil actually enriched in that important item of plant-food.

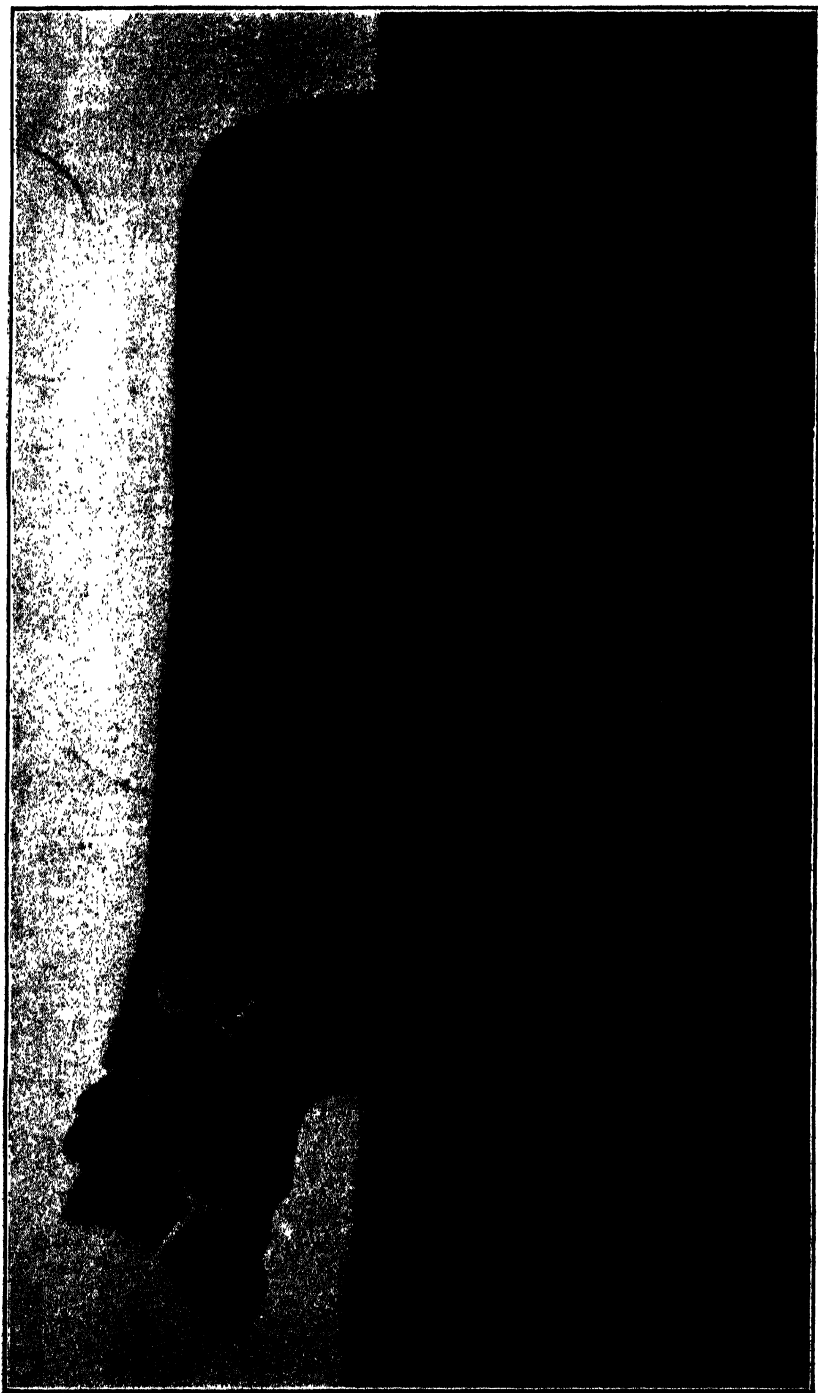
In New South Wales legumes are grown for various purposes: Lucerne for hay and grazing, clovers as an important constituent of pasture mixtures, field peas, vetches, cowpeas for green fodder and hay, and also for green manuring and soil renovation, and garden peas and beans for the vegetable market and home use. Their place in our farm practice, indeed, is even larger than might be apparent at first sight, for the "herbage" that springs so abundantly on wheat lands when these are "left out," and that is so highly esteemed as pasture, consists largely of trefoils, which are as much legumes as lucerne or clover.

The secret of the value of these plants to the farmer is the possession of a source of plant-food that is not accessible to most other plants, particularly not to cereals. The practical experience of hundreds of years led farmers of past generations to believe that leguminous crops possessed some peculiar power of making succeeding crops grow better, and it was not till the last twenty-five or thirty years that this could be explained. It is now known that association with certain bacteria in the soil enables legumes to make use of the air in a way that other plants cannot.

This association is one of mutual helpfulness, or symbiosis, the bacteria requiring considerable quantities of certain kinds of foods that are generously supplied in the plant juices of legumes, while the plants derive from the bacteria, in some way not yet fully understood, a supply of nitrogen that the bacteria have taken from the air and built into nitrogen compounds within their own cells. It is supposed that the nitrogen compounds thus manufactured by the bacteria are diffused through the cell walls and absorbed into the general circulation of the plants, where they are used for the building up of the protein compounds that are characteristic of the legumes in whatever form they are considered.

The presence of these bacteria is indicated by the development on the roots of the little growths now universally known as "nodules." These little swellings vary from the size of a pin-head to the size of a small pea, and they may sometimes be seen by carefully digging up a plant with as many of the small roots as possible and then washing away the earth in a gentle stream of water.

There is unfortunately an impression amongst farmers that, if the leguminous crop is removed from the land and the roots with their nodules remain, the soil is thereby enriched in nitrogen. It must be clearly understood that the nitrogen taken from the air by the organisms does not exist in the nodules, but is made use of and distributed throughout the plant, and that the removal of the above-ground portion of the plant from the land means the removal of a large amount of nitrogen. An increase in the nitrogen content of the soil can only result from the growing of leguminous crops when they are fed off, ploughed in, or soiled to stock, and the resultant manure from the stock returned to the soil.



From "Farming"—an English Publication.]
PLATE 99.—BRITISH BREEDS OF LIVESTOCK.
The type of Aberdeen Angus Cow favoured by breeders in the Old Country.

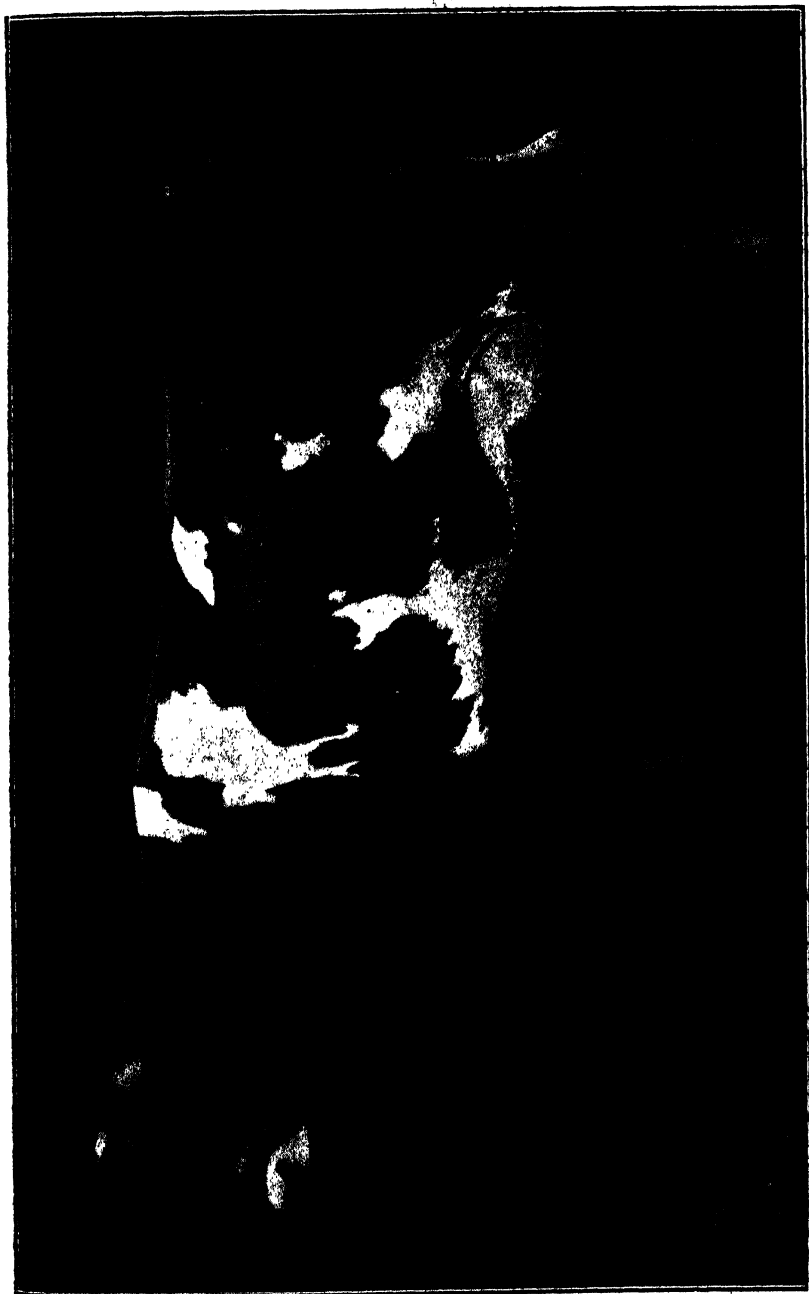


PLATE 100.—BRITISH BREEDS OF LIVESTOCK.
A type favoured by Jersey breeders in Britain.

From "Farming"—an English Publication.

AUSTRALIAN PIG INDUSTRY COUNCIL—ANNUAL MEETING.

At the third meeting of the Council for the Australian Pig Industry held at the Commonwealth Bank Offices, Sydney, on 25th March last, representatives were present from New South Wales, Queensland, Victoria, Tasmania, and South Australia, as well as from the Commonwealth Department of Markets and Transport. Mr. George W. Gordon, of Raleigh, New South Wales, was re-elected chairman and presided over the gathering.

The Council approved of the appointment of Mr. A. F. Gray, Senior Piggery Instructor, Department of Agriculture, New South Wales, and Mr. William Gamble, a member of the Victorian Council of Agricultural Education, to represent the Agricultural Colleges on their State Pig Industry Committees. It was also approved that Mr. Mitchell be a representative of the New South Wales Pig and Poultry Farmers' Association on the New South Wales committee. It is expected that a recommendation will shortly be made by that committee for the appointment of additional representatives to the Committee of the Proprietary and Co-operative Bacon Factories.

With reference to the question of forming committees in each of the States for the stabilisation of prices the chairman reported that a body of this nature had been formed in New South Wales under the title of the New South Wales Bacon Curers' and Distributors' Association, consisting of proprietary and co-operative bacon manufacturers and wholesale agents. The Queensland members intimated that the Queensland Bacon Curers' Association, comprising proprietary and co-operative companies, which was formed some time ago and which determined terms and conditions of sale and the matters relating to the branding of bacon in Queensland, was working smoothly and satisfactorily. The Council recommended that similar Associations be formed in Victoria and South Australia.

Experiments in Breeding Pigs.

Mr. A. J. Mackenzie, Instructor in Animal Husbandry, at the Gatton College (Queensland), gave an interesting address on the experiments in breeding pigs being conducted at that College.

Pig Nutrition.

A paper on Pig Nutrition was prepared by Mr. Lance le Souef, Melbourne, and copies were distributed to the members and referred by the Council to the State Pig Industry Committees for comment with the object of discussion at the next meeting of the Council.

Propaganda to Increase the Home Consumption of Pork Products.

After reports were received and progress in the different States noted, it was decided to refer the matter back again to the various State committees for further action.

Fire Branding of Pigs.

The New South Wales committee reported that provision had been made in the new draft of the proposed amendment to the Pastures Protection Act for the inclusion of a clause which would give certain powers to carry out the wishes of the Committee with regard to branding pigs. The Victorian Committee considered it was not necessary to request the State Government to introduce legislation to provide for the compulsory fire branding of pigs. Experiments are being conducted in that State in the tattooing of pigs. The State Committees are to submit further reports at the next meeting.

Inspection Certificates.

The question of the acceptance by State authorities of certificates relating to pork products issued by the inspectors of other State Governments was considered. It was stated these certificates are already accepted by the Victorian and Queensland Government Departments. The matter was referred to the New South Wales and South Australian committees for further report.

Mortality in Young Pigs.

This question is now being investigated by the Council for Scientific and Industrial Research and it was decided by the Council for the Australian Pig Industry

to ask State Government Departments, Agricultural Colleges, and other bodies conducting experiments with regard to the breeding and feeding of pigs to give special consideration to the subject of mortality in young pigs.

Payment of Compensation for Pigs Condemned on Account of Tuberculosis.

A lengthy discussion took place on this subject and it was definitely decided to refer it to the State Committees of New South Wales and Victoria for further consideration as far as their respective States are concerned and for report to the next meeting of the Council.

Transmission of Hams per Parcel Post.

The Queensland members intimated that there was a good demand for hams to be despatched per parcels post, particularly at certain seasons of the year, e.g. Christmas and Easter. It was therefore decided to approach the Postmaster-General's Department with a view to having postal regulations amended in order to permit the acceptance for transmission by parcels post of hams securely packed and of a maximum weight of 15 lb. Present regulations do not permit of this.

The next meeting of the Council will be held in Brisbane immediately prior to the Brisbane Show in August next.

PIGS AT TOOWOOMBA SHOW—1929.

A particularly good entry of fine quality pigs, placed before the judge under much more favourable conditions than is possible at many of the smaller country shows, was evidenced at this year's Toowoomba Show, where, under favourable weather conditions and with bright seasonal prospects, the entry indicated the growing importance and popularity of this branch of agriculture on the far-famed Darling Downs.

The time taken in preparation and the enthusiasm displayed by the various exhibitors indicate the future success of the industry. If one can judge by the quality of the stock, and particularly the very fine entries of bacon pigs, then pig raising will continue to be a profitable and popular venture and the stock produced will be in great demand in Southern Queensland.

The pig industry on the Downs appears to be on a very sound financial basis and judging by the capital invested in the Darling Downs Co-operative Bacon Company Limited, and the results of the year's activities at the factory at Willowburn, it is apparent that "money in pigs" is no mere slogan but an actual fact. It is evident, too, that the products of the factories on the Darling Downs (for there is another successful factory at Mill Hill, near Warwick, conducted by the Warwick Bacon Company Limited) continue to find a ready market not only in this State but in the markets of the South where profitable prices are obtained.

Breeds.

Berkshires and Gloucester Old Spots were equal in general average, though there were more entries of the former than of the latter. Tamworths made a good showing as also did a very fine pair of Duroc-Jerseys, but the Yorkshires and Poland-Chinas were not up to standard and were present in very small numbers.

The porkers were an even lot and the eight pens, each containing three prime quality bacon pigs, were equal to any in the State. They were all shown in excellent marketable condition.

The veteran Council Steward, and the officer in charge of the Pig Section, together with the exhibitors, endeavoured to make the section an attractive and popular one, and the fact that so many people interested themselves in the exhibits was sufficient justification for the space allotted and the expense incurred in penning such a fine exhibit.

Hams, Bacon, Lard, and Small Goods.

The display of hams, bacon and other factory products was of high standard and indicated the wide range of products obtainable from the carcass of the hog. Unfortunately, competition was reduced to the exhibits of the Darling Downs Co-operative Bacon Company Limited, but, nevertheless, the quality was of such a high standard that any other competitor would have to show exceptionally good products in order to win. The trade display of bacon factory products was attractive and of great educational value.

SCHOOL OF INSTRUCTION TO PIG FARMERS AT GATTON COLLEGE.

Attention is called to the annual school of instruction to pig farmers, to be held at the Gatton College during the period 10th to 20th June, 1929.

The schools have been organised to provide the means whereby farmers, their sons and daughters, desirous of improving their knowledge of pig-raising, may come together at a convenient centre for the purpose of meeting one another and attending practical demonstrations and lecturettes, indoor studies, &c., on every phase of pig-raising.

As early application is necessary, it would be well for those interested to get in touch with the Principal of the College so that arrangements may be made in ample time before the school opens.

Professor Murray advises that there need be no fear on the part of the farming community with regard to the attendance at this school of members of their families, for provision has been made for accommodation and meals, and those attending can be assured their personal wants will not be overlooked. The social side of the life of these schools is a special feature. Every evening before the lecture session begins, a free and easy hour for questions and answers, during which questions relative to any branch of agriculture may be asked, has been arranged. At these sessions officers attend who are interested in other branches of college life; in fact, question time is one of the most interesting periods of the day for those interested in orcharding, dairying, and other branches of farming, as well as pig-raising. The evening cinematograph and lantern lectures are also of interest and value and are much appreciated. As opportunity offers, prominent authorities on agriculture, apart from departmental officials, will give addresses. An added attraction to the school programme is the visit of inspection to the metropolitan bacon factories.

The school fees are exceptionally reasonable and concession fares on the railways are available to those attending. Further particulars may be obtained by writing to the Principal, Queensland Agricultural High School and College, T.P.O. South, or from the Department of Agriculture and Stock, Brisbane.

It might be mentioned that at the College piggery more than 300 pigs are kept. These comprise representatives of the several breeds in Queensland, and they are bred for stud purposes as well as for the production of pork and bacon. An extensive series of experiments in the breeding of pigs has been recently added to the activities of the pig section. These experiments are under the control of the Departments of Public Instruction and Agriculture and Stock, and of the Queensland Pig Industry Committee as representing the various bacon factories. Considerable interest is being displayed in the results of crossing the various breeds together, and this section should be of considerable interest to those attending the Pig Farmers' School. Several lecturettes will be arranged to indicate just what is being done, for the objective is to test out under farm conditions the prolificacy, suitability, early maturity, and economy of production of various types of pigs. The pig section, therefore, is one of great educational value and one in which farmers generally will be interested.

A VALUABLE HELP.

A Bauple reader writes (4th March, 1929):—"The Journal I find is a most valuable help to me in many ways. The advice and hints contained therein, if followed closely, do much to make farm life and work more easy; so much so, in fact, that much useless labour may be omitted and much more profitable work accomplished. The fact is that work done does show more satisfactory returns when the Journal's advice is put to practical use. Wishing you and it every success."

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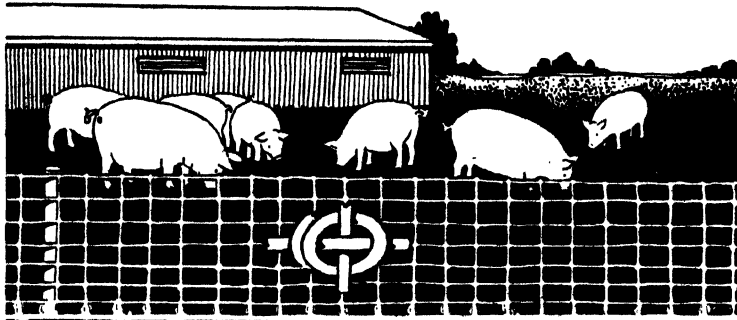


Mr. Murray-Gibbes.

Mr. MURRAY-GIBBES, the well-known Composer, writes :—"I am more than delighted with the speedy way Heenzo soothed my throat, eased the chest, and banished a very heavy cold that had troubled me for some weeks. Now I am never without a supply of Heenzo in my medicine chest."

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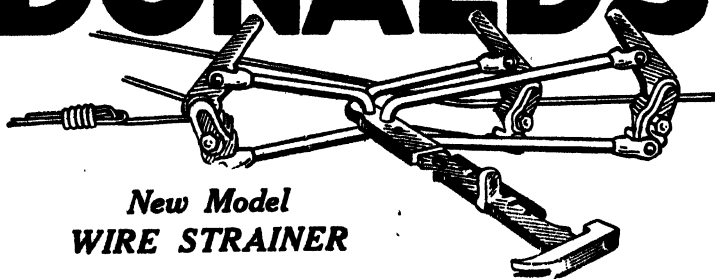
"RING-KNOT" Pig fence is 30 inches high, 8 line, and spaces are from bottom 3 inches, 3 inches, 3½ inches, 4 inches, 4½ inches, 6 inches; uprights 6 inches apart.

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WEANING THE PIG.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

ONE matter worthy of special attention on the pig farm is that dealing with the correct age at which to wean pigs. There is no hard and fast rule that must be followed to ensure success, as the age at which to wean pigs will depend largely on the system of management that is followed on the farm and the development of the litter. If it is intended (as it should be) that the sow is to produce two litters yearly, it will be necessary to wean the pigs as early as practicable in order to allow the sow being mated in time for the next farrowing. For this reason, it is advisable to wean the pigs when they are eight weeks old. The sow carries her pigs for four months (the gestation period is usually 112 days), and suckles them for two months, making six months in all with each litter. Generally the sow will come in season three days after farrowing, and every three weeks after that, although it rarely happens that the sow will show as being "on heat" before the ninth week after farrowing, and it is at this ninth-week period when she should be mated to the boar.

Some breeders are able, in the case of a sow with a very small litter, to induce the sow to come in season by keeping her and her litter separated for several nights in succession at about the sixth week after farrowing, or even sometimes at the three-day or three-week period. In such cases it is an advantage to feed the sow liberally after going in pig and to allow her to suckle her pigs for a longer period;



PLATE 101.

A group of weaners of the Berkshire type engaged in a hunt for peas in a crop of cow peas into which they were turned to graze while they were passing through the weaning and slip stages. The other food consisted of milk and cereal meal and they had ample drinking water and charcoal.

but this system can only be recommended in cases where the sow has a small litter or where she is carrying plenty of condition, for the gestation and lactation periods are severe on the dam and impose a double burden on her at a time when she should be building up her body in preparation for the litter to arrive and be suckled.

If the young pigs, when about three or four weeks old, are provided with a small trough (concrete, steel, or block tin preferred) placed in some convenient spot where the sow cannot get at it, they will soon learn to eat and drink freely, and if they are also allowed good pasture the process of weaning will not be difficult and the pigs will not be checked in growth; also the strain on the sow will not be so great if the young pigs are handled in this way. Both sow and suckers should be allowed an abundant supply of drinking water. On the other hand, if the young pigs have to fight for a mouthful of food at the trough where the sow, and, perhaps, other pigs are feeding, then the weaning period will be severe on the pigs, and the sow will not do as well. For three or four days before weaning the sow should only

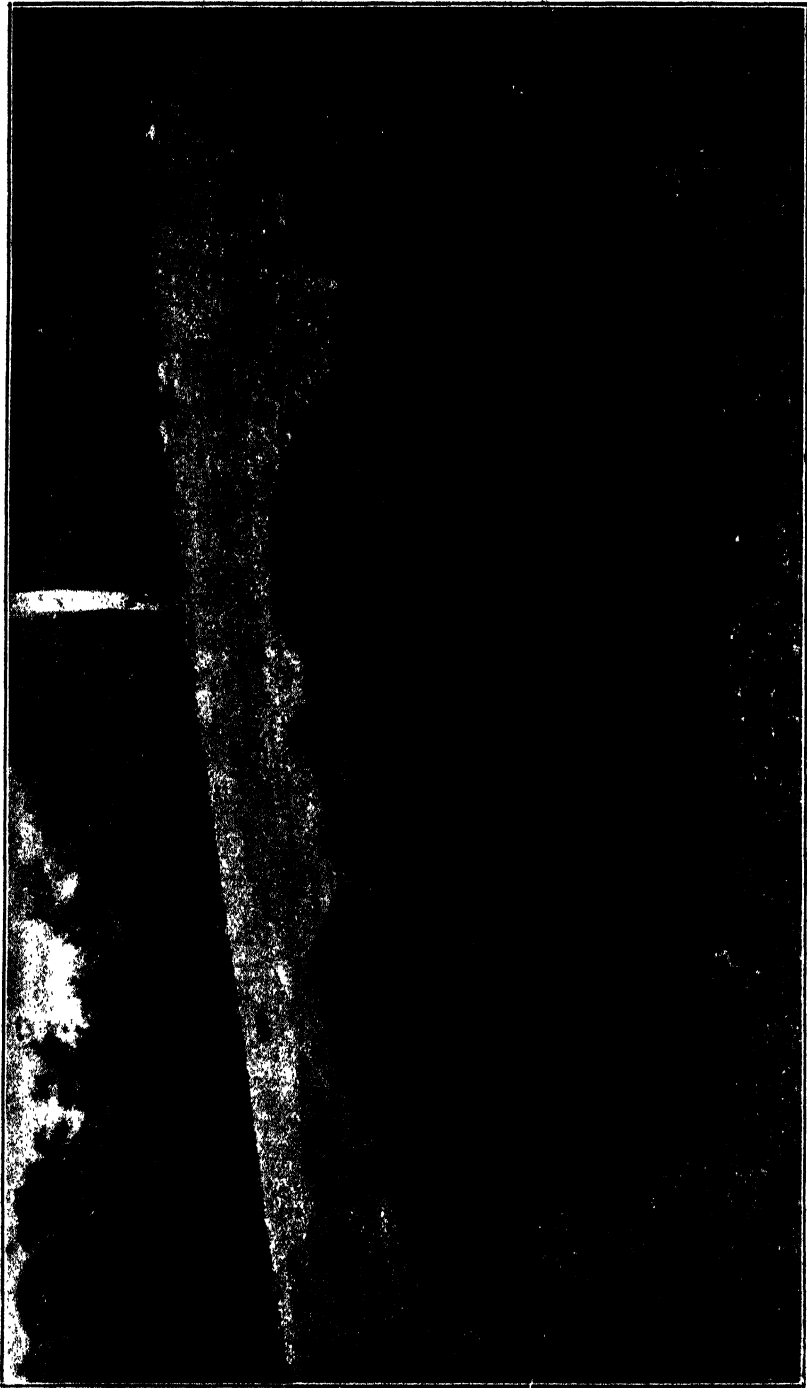


PLATE 102.—A THRIFTY PROFITABLE LITTER.

Tamworth-Berkshire Pigs, fourteen in number. They were eight weeks old at the time the photograph was taken. They were the property of Mr. George Stanfield, of Wondai, Q.



PLATE 103.

Prize winning weaners of Middle Yorkshire breed, property of Mr. Ralph Joyce, a prominent Victorian breeder. The sow only reared seven pigs of this litter, but she made an exceptionally good job of her share of it, while the owner did not spare the feed given to the rapidly developing youngsters.

receive about one-half of her ordinary ration; this will cause a decrease in the milk flow. The sow should then be taken away from the litter, leaving the young pigs in the surroundings to which they have become accustomed. The pens and pastures in which they are kept should be clean, sanitary, and of good area, and so be conducive to rapid growth. The sow should be carefully handled until her milk supply ceases. Some breeders allow the smallest pigs to remain with the sow for about a week after the largest ones have been weaned, and this practice is to be commended, particularly if the sow has an abundant supply of milk and has been rearing a large litter. It is a decided advantage, if it can be arranged, to allow a small, weakly litter to remain with the sow until the pigs are about ten or twelve weeks old, in order to give them the additional benefit of the sow's milk, but this is seldom necessary if the young pigs are taught to eat from a separate trough whilst still suckling.

Young pigs should be given an allowance of lime water in their food two or three times a week; they should also have access to clean water, and should be provided with charcoal, bonemeal, wood ashes, and a lump of rock salt. Under these conditions, weaning should not check the development of young pigs.

Profitable pigs should grow rapidly, mature early, and be ready for marketing as soon as possible at the lowest cost of production, with the least amount of labour, and with the maximum of saleable meat and a minimum of loss. This cannot be done unless they receive a good start in life and unless they recover from weaning without the all too common check in growth. Strictly speaking, the time to start caring for young pigs is long before they are born, for the strength and development of the pigs at birth depends entirely upon the feed, care, and attention given to the sows, and upon the type, quality, and condition of the sires. In addition to this, the very best pigs may be absolutely ruined and checked in their development if special care is not taken to see that they pass through the weaning stage without loss in weight or check in growth.

Do not Wean Pigs too Early.

It is a serious mistake to wean pigs at four, five, or six weeks of age and expect them to develop and mature to advantage, especially where, immediately after weaning, they are offered for sale and transferred to new owners. They then receive a change of food and environment and entirely new conditions of life. Pigs treated in this way seldom prove a good investment. If they survive they develop into slow growers and are unprofitable. Of course, even these adverse conditions can be overcome by giving them extra care and attention, but the system is not to be recommended, for, by allowing them to remain with the sow for another two weeks they would develop to more advantage and sell better. Breeders who handle pigs in large numbers and feed them on the refuse of hotels, cafes, markets, and on butter milk, will not purchase very young pigs, for they have learnt that such pigs are not profitable. Taking the amount of profit into consideration, the sow's milk is the cheapest and most efficient food for pigs of one to three months of age, supplemented (after the first month) with other and equally nutritious foods. It is more profitable to give the sows additional supplies of food in order to obtain continuous milk production, than it is to wean pigs at six weeks and attempt to force them on more rapidly than they will develop while suckling. If the food which the very young pigs are receiving is supplemented in the manner indicated, the result will be far more satisfactory, both for the litter and the sow. The sow's milk production may be increased by efficient feeding and handling in just the same way as milch cows, and every dairy farmer knows how rapidly the milk flow increases when conditions are favourable and a good supply of food is at hand.

Castrate the Young Boars at Six Weeks.

It is an advantage to castrate all male pigs not required for breeding purposes when they are six weeks of age and before sexual maturity is reached, as at this age there will be considerably less shock to the nervous system and the growth and development of the pig will not be checked. If the pig is still suckling its dam when castrated, the wounds, if kept clean, will heal up rapidly, and the pig will become more thrifty, and will be in a better condition for weaning. A five or six-weeks-old pig is small enough to be handled conveniently, while the testicles will be large enough to render their removal easy. If the castration be correctly performed, within a few minutes of being released from the operation the young pigs appear normal and are soon suckling and eating again, while older pigs are sickly, sore, and very stiff for several days, eating and drinking little. There is also considerably less pain associated with the operation if performed at six weeks of age.

Weaning, an Important Subject.

It will be seen, therefore, that weaning the pig is quite an important item in the profitable management of pigs. Further information may be obtained at any time on application to the Department of Agriculture and Stock, Brisbane, where, also, many useful pamphlets on pig raising may be obtained gratis.



PLATE 104.—A PRIZE-WINNING LITTER.

A prize-winning litter of Middle Yorkshire pigs at weaning age. Note evenness of type and good quality of these pigs, and the medium condition of the sow.

USE AND CARE OF MILKING MACHINES.

Milking.

Keep the milking shed, yards, and surroundings in a clean, sanitary condition. Wash the cows' teats in clean water, and draw milk from each teat and ascertain if the milk is normal before putting on the teat cups. To place the teat cups in position bend them all down except the one you are going to attach to the teat; attach each cup in like manner. When the cups are all attached and the milking is proceeding satisfactorily, do not interfere with the machines until the cow is milked out. See that no air enters the cups and destroys the vacuum; this defect is indicated by a hissing sound caused by the air rushing into the cups.

Should a cup fall off the teats give it immediate attention, as the suction will draw dust and particles of dirt into the system and contaminate the milk.

The cleansing of the milking machines is the most important part of the dairyman's operations. Failure to thoroughly wash and properly cleanse the plant after each milking will result in the production of low-grade milk, cream, and dairy products.

Cleansing the Machines.

After completion of milking do not delay in carrying out this important work, which will, if properly performed, materially assist in producing high-grade milk.

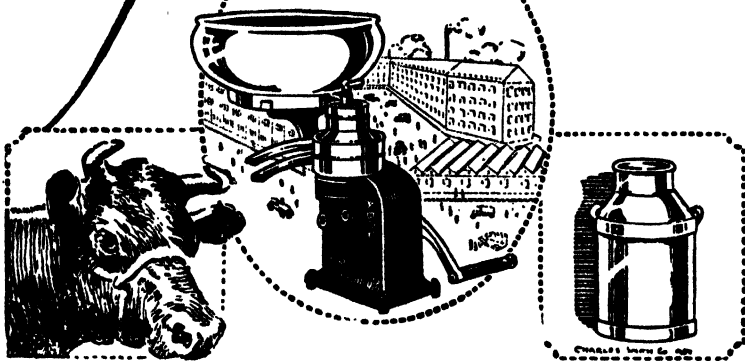
Turn off the air tap in each bail. Start at the end bail and clean adhering particles of dirt from the outside of the cups and claws so as to prevent the dirt entering the flushing water. Then thoroughly flush each unit in turn by drawing through it at least half a bucket of cold water, dipping the cups in and out of the water so as to draw in air during the flushing. A thorough flushing out with cold water will remove traces of milk and grease from the rubber teat cups, pipes, releaser, &c. Always use cold water for this flushing. On no account should hot water be used, as it will tend to cause casein to become caked on the inside of the pipes. Scalding water at a temperature of at least 180 deg. Fahr., to which may be added one tablespoonful of washing soda to every 2 gallons, should then be drawn through the cups and pipes, care being taken to admit the water slowly at first in order to gradually heat the sight glass so as to prevent its breakage. Thoroughly clean the milk pipe line by means of the brush supplied with the machine, and according to instructions. The air pipes and vacuum tank, which frequently become foul owing to milk vapours entering and condensing in them, should be regularly cleansed and sterilised with boiling water. With machines in which water can be drawn through the air pipes by means of the vacuum pump, care should be taken not to flood the vacuum pan, thereby causing the water to get into the pump. The sterilisation of dairy appliances and equipment is most effectively and economically done by boiling water, and where it can be utilised nothing is usually gained by the addition of chemical disinfectants. When the cleansing of the piping is completed, open all taps and leave the pump running for a few minutes to dry out the pipe line. This assists in keeping the plant in a sanitary condition. Leave all pipes open when the plant is not in use, so as to allow the air to circulate through the system. The releaser should be detached, thoroughly cleansed, and allowed to dry.

Cleansing the Teat Cups.

When the flushing out of the machine as described has been completed, remove the teat cups and rubber connections. Disassemble the cups, and carefully brush the cups and claws with a dairy scrubbing brush. This should be done in hot water in which soda or a cleansing powder has been dissolved. It is essential to remove all grease in the first flushing and to then brush and cleanse the rubbers. If the rubber inflations have not been thoroughly cleansed they will be sticky to the touch, which is an indication of a film of grease on the rubber. The surface of a well-cleansed rubber will cling when the finger is rubbed along it. Careless cleansing will allow the grease to penetrate the surface of the rubber to the extent that it cannot be scoured out, and the rubber will perish. Rubbers so affected should be discarded. Careless cleansing of the inside of the teat cup cases gives rise to corrosion and pitting of the surface. Where cups have screw caps the cleansing of the threads should receive attention, and a slight smear of vaseline applied to threaded parts will assist in keeping them in good order. The disassembling and cleansing of cups and claws should be done as frequently as possible and not less than three times a week.

Cups and rubbers, after being cleansed, may be either left in an antiseptic solution or may be dipped in same for fifteen to twenty minutes, then removed and

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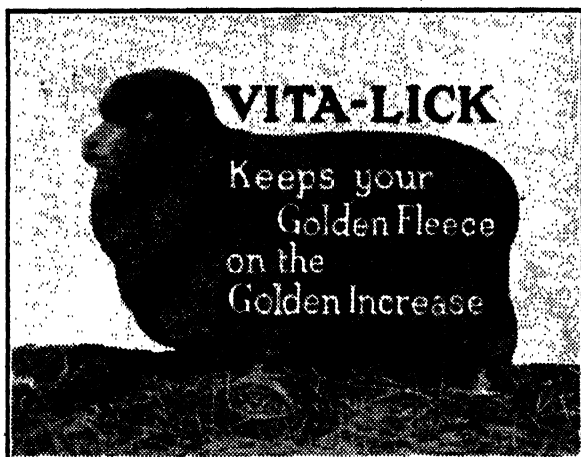
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placed in a suitable receptacle in a cool place, away from the light, and protected from flies and dust. The vessel in which the disinfecting solution is held must be large enough to allow the teat cups and rubbers being immersed in the solution without doubling the rubber tubes in a manner to prevent the complete displacement of air by the disinfecting solution.

Several solutions for dipping or soaking the cups and rubbers are recommended by manufacturers of the different milking plants, and include chlorine compounds, lime water and permanganate of potash, and brine solutions.

Special attention is drawn to the necessity of removing all traces of the solution that may be used for the sterilisation of the cups, rubbers, pipes, &c., that come in contact with milk, before the machine is again used. This is done by flushing each unit with sufficient hot water to effectively remove any trace of the solution before commencing to milk.

Many dairymen object to very hot water for cleansing rubber, believing that the rubber is destroyed. The judicious use of hot water will do no harm to rubber, provided that all grease is removed from the rubber before the hot water is applied. Rubber, if kept in water for ten to twenty minutes at a temperature of 165 to 175 deg., will be unharmed by the heat, and most bacteria which detrimentally affect milk will be destroyed. If the rubber is placed in water at a temperature of from 180 to 190 deg. Fahr. long enough only for the surface of the rubber to be heated to the same temperature, the same object will be attained without injury to the rubber.

Lime a Suitable Disinfectant.

An efficient disinfecting solution is made by adding two pounds of quicklime to ten gallons of water. Stir well and allow the solution to settle. Pour off the clear liquid and immerse teat cups and rubbers in it for a period of fifteen to twenty minutes.

THE CULT OF THE COLT.

“By ‘U 9 L.’”

IX.

KICKING AND OTHER BAD HABITS.

This colt we're handling now seems possessed of all the imps of perversity. It won't do anything right, and so far as it lies within its power it seeks to annoy us. Lately, and since we've been buckling the girths on it, the brute's adopted a habit of cow-kicking. That's a low-down trick, and it's one only to be expected of a base-born caitiff such as this. Apart from everything else it's a breach of good manners. Sometimes, rarely, a stick isn't a bad idea. And other times, mainly, a stick is only an inducement to continue the malpractice. That sort of thing has just to be overcome by custom, by familiarity and by teaching the thing that we're not hurting him intentionally. In that way do we curb his ulterior ambitions, and always, with any sort of a colt at all, must we restrain our own baser motives.

Punishment a Last Resource.

Kicking, striking and biting all come within the same category. A man needs to be a jolly good judge of equine temperament to know whether a stick's going to be efficacious or not, and if he muddles the job at all it only makes the offence more aggravated and of a greater hair-trigger disposition. Leave punishment alone till all else has failed. As a last resource, perhaps, it may be useful to tie up one fore leg. You just double the leg and put a saddle strap round it. It looks a fragile tie and one on which a man wouldn't place much reliance. But it's safe as a bank. Most horses on three legs have to stay on those three legs to preserve their balance at all. That means they can't kick. That is the time for a man to move about them and to get familiar with them. Sometimes, odd times, a man may cure a devil in that way. At other times the cunning brute merely waits for the odd leg to be released before recommencing its tricks, and again odd ones are able to balance temporarily on two legs and use the other as a means of offence. The whole

* In the “Pastoral Review” for January, 1929. Previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928), January, February, March, and April (1929) Journals, from the February, April, May, July, September, October, and December (1928) numbers of the “Pastoral Review.”

thing is a ticklish job, and no fitting remedy may be recommended without a diagnosis of the colt's temper. That entails a personal inspection, which isn't possible through the keys of a typewriter.

When a Rider wants Springs in his Boots.

Another fiendish aggravation which this horse adopts is that of refusing to stand when we go to mount. We're supposing we're man enough to be able to mount the thing even while it's in the process of going through the ring of the bit, if need be. But that's not good breaking. This colt has to stand while we clamber on him, and he's got to be steady enough for the oldest boundary-rider to mount before he leaves our hands.

"Rein him up and make him stand" is the advice given. "Pull his head round on to his shoulder and hold him." That, and sundry other advices are handed out free and regular. And they're no good! If a colt's head has to be pulled round to his shoulder to make him stand he always looks for it. If it's not done then he takes advantage of that omission, and a rider has to have springs in his boots to mount him. Don't pull a horse's head round, that's my advice. Hold him with a reasonable degree of firmness, by all means, but don't make a contortionist of the horse when you go to mount him. If you have the ability to mount him steady and without fuss you'll find that the colt will reciprocate. He'll steady down with custom, and provided you don't make a mull of any mount he'll come to his senses and your notions in no time.

The Best Position for Mounting.

As always, the best position when about to mount a touchy colt is right in close to him. Keep your own body pressed against him, your knee in his shoulder, and above all see to it that you keep in close all the time you're in the air and that your right arm is bent at the elbow. That's the big point: that crooked elbow. That gives you command of position and elasticity of action.

Though I haven't referred to "lugging" a colt, that advice is almost sure to be handed you. And however vehemently the advice is tendered, I as emphatically say No! It makes the colt stand—that's admitted—and in that motionless position you may climb on in comfort. You can't! Apart from that, it's only teaching the thing bad manners. It's making it touchy about the ears—it's teaching it that it may only be mounted when "lugged," and the day isn't too far distant when that colt is going to refuse to allow you to catch hold of its ear. In fact, it's going to be a dickens of a job to get the bridle over its head at all. That's what's going to happen.

Don't Rush the Mounting Process.

If you have the necessary length of limb and the agility to indulge in lugging, why not adopt a better and more harmless method of achieving your purpose? This is it. You have the colt reined ready to mount, and as you lift your foot to put it in the iron that colt commences to wriggle in preparation for a bound, and perhaps it takes a step forward. Don't put your foot in the iron. Instead of doing that follow another course. Drop your left hand from the crest of the horse's neck and put it round quickly under his neck at the point where that neck joins the chest. Gather a bit of loose skin there and hold it firmly in your clenched hand. That makes the brute stand without the application of undue force and easily. In fact you may mount him from that position and he'll not move during the process. But it's risky, though it has been done, and I maintain that the recovery from that position is little more difficult than from the lugging position. Anyway, if you do that several and sundry times when about to mount you'll find that the colt responds quickly and in next to no time he'll stand while you mount. But please don't rush the mounting process. Nothing is more conducive to a colt's uneasiness than a hurried mount. It can be done almost as quickly, twice as safely, and better in every way if there's no hurried haste.

Man and his Mannerisms.

At about this stage I'd like to repeat that a horse, particularly a colt, gathers its own mannerisms from the man who's handling it. Later on in life, when the thing's older and more set, it borrows something of the mentality of the man who regularly rides it, but in its stage of educational infancy it's quick to pick up notions and habits from the man who's teaching it. I point that out, not necessarily that a man may make use of it to his own benefit, but so that a breaker may understand it's better and more fitting that he curbs his temper and always preserves an even amiability towards his charges.

If, in any of your actions—mounting or anything else—you give the colt an impression that you're nervous about it, then as sure as eggs that colt will be fearful in the same operation. If you rush your mount, so will the colt try and make a lightning process of it; if you shirk any risk, so will the colt take advantage of that timidity; and in a hundred and a dozen ways it is right that the breaker should meet his colts with an even temper and without fear—a feeling of comradeship is, perhaps the best way to explain it.

We're done with this sour-tempered brute now. Of course, there are dozens of little faults and foibles which I've omitted. To deal with them all in detail would be an endless task, and anyway, the whole thing is distasteful. Though a breaker may not be able to make a horse of the thing, at least he knows he's not spoiling one—it could never be a horse worthy of the name. I'll deal later with sundry little tricks which may help to overcome fractiousness, but as they would apply equally to all sorts of horses, I'll leave them for the time being and now refer to the very important part of riding.

BUCKJUMPERS.

Horses don't buck like they used to. We'll take all that as read. If we doubt it we can get confirmation from many greybeards, and at least their word is worthy of respect.

Even so, in more or less recent times I've known 'em switch their tails in an offensive manner. I'll agree, however, with anyone that not one per cent. of so-called buckjumpers can buck. In the vast majority of cases that bucking is only rooting, and the rest is built on imagination and inexperience. Still, odd ones do.

The big question before the council is: Should or should not a buckjumper be flogged. This refers to the breaking, of course. Rather it applies to the riding after the first spell, and when the horse has learned to balance his load. Some men can do it, and they like to do it. Others have a notion that they'd like to do it, and their attempt ends in disaster. That's bad for the colt, and it doesn't benefit the man. My idea is that if a colt likes to go steady then by all means let him proceed evenly, and if he bucks properly then I'm so fully occupied usually I haven't time to think of anything else. Apart from everything else, and whether a man's able or not to do it, it's a question of judgment of character—psychology is the word, isn't it?

When "Pronging" the Pigskin.

If you take a colt steadily, soothingly, and if you treat him in a brotherly fashion, and he will persist in putting his head down and cutting capers, what about it then? It depends entirely on what prompted that outburst. It may be fear, it may be that the thing's uncomfortable, it may be a little display of animal spirits, and it may be vice. For the first three I'd enter into the spirit of the thing and mix it mentally with the colt while he indulged his whims, and for the last I'd pour the mop into him good and plenty, soaking him till he cried crack, and then hand him some more for good measure. Mind you, it may be wrong, and it might only add to the colt's bad temper. But if the display is prompted by vice then I maintain there's no harm done. It will grow worse itself if let alone, and there is a chance of nipping that evil in the bud. There's a don't attached to this, of course: Don't get thrown. If you're tossed then you've taught that horse a bad example which is going to take much erasing, and you've landed yourself in a dickens of a mess—if you're a man at all you're the one who's going to rectify that error.

Riding a Rough 'un.

Riding a buckjumper is easy—to some people. I've known two—no, three—men to whom it was a natural gift. To the rest of us the art is acquired with much practice, with many pains—like genius—and with stiff limbs and sweat of blood. And then, once you've got there, you must keep in practice. The art of the whole thing is in anticipation—you think just one shutter-click of time ahead of the horse what he is going to do next, and you anticipate that move in readiness for it. That's all. One of the gifted riders to whom I refer—the third—explained it slightly differently. He stated that the rider lost a certain amount of ground, or position, with every leap of the buck, and that he regained that lost position, and a bit more, every time the horse hit the ground. That's easy, too, to gifted horsemen. A breaker must be able to ride, of course, and as I've stressed from the beginning he must be in mental accord with his horse and know when and where not to do things. There you have it in a nutshell whether a buckjumper should or should not be flogged.

Answers to Correspondents.

BOTANY.

From the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.

Queensland Kauri—American Redwood.

T.A.P. (Toowoomba)—

Your specimen is the Queensland Kauri, *Agathis robusta*. The New Zealand plant has much smaller leaves than ours. The leaves on coppice shoots or on young trees in the New Zealand plant are very much narrower than in our species. There is no doubt about the determination. The germination is generally poor in Queensland Kauri, especially in the seeds from cultivated trees.

We do not know how you will succeed with American Redwoods. The only place we think where this tree will do will be in the highlands of South-Eastern Australia. We have seen trees at Ballarat, but on the whole it does not seem to do as well as its sister species, the Giant Tree or Big Tree, *Sequoia gigantea*. It is, however, generally regarded as being very much superior as lumber.

Carpet Grass.

S.F.W. (Upper Coomera)—

The sample of grass forwarded by you is *Paspalum platycaule*, the Carpet Grass, a native of the warmer parts of America, but now widely spread over the tropical and sub-tropical regions of the globe. It is very common in North Queensland, and less so in the South and the Northern Rivers of New South Wales. It has rather a mixed reputation as a fodder, but for good soils is not equal to the ordinary *Paspalum*. For poorer soils where the common *Paspalum* does not do too well, it is a useful grass.

Yellow Oleander—A Poisonous Plant.

H. (Rosalie)—

Your specimen is *Thevetia nerifolia*, sometimes known as the Yellow Oleander, a native of South America and the West Indies, cultivated in warm, temperate, and sub-tropical countries as an ornamental shrub. All parts of the plant are poisonous, and on this account the shrub is a dangerous one to have growing where there are young children.

Tree Groundsel.

A.M.B. (D'Aguilar)—

Your specimen forwarded is *Baccharis halimifolia*, the Tree Groundsel. An article on this plant was published in this Journal for July, 1923. The plant is a very strong grower, and on this account we are doubtful about the efficacy of arsenical sprays, though, if repeated several times, it may be killed. Grubbing out the bushes seems to be the only satisfactory method of extermination.

Leopard Flower—Wild Marjoram.

G.H.J. (South Brisbane)—

Your specimen is *Bellandanda chinensis*, or sometimes known as *Pardanthus chinensis*, the Leopard Flower, a tall-growing plant of the Iris family—Iridaceae—a native of China.

The other plant you refer to is *Ocimum sanctum*, sometimes known in North Queensland as Wild Marjoram, and used by bushmen as a tonic, being taken in the form of a tea. This plant is fairly common in parts of the Gulf country, but the handiest place we have it recorded for in quantity is Charters Towers and it is said to be fairly common there. If you know any chemist at Charters Towers he should be able to put you in the way of getting a fair supply at the present time. It is a Labiate, about 2 feet high, the leaves rather greyish-green, with a strong "labiate" smell.

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Central Queensland Plants Identified.

M.L.F. (Dalma, via Rockhampton)—

1. *Sterculia rupestris*, the Bottle Tree.
2. *Sterculia trichosiphon*, the broad-leaved Bottle Tree. This is sometimes called Kurrajong in Central Queensland, though the name Kurrajong, strictly speaking, belongs to another and closely related tree.
3. *Setaria macrostachya*, Scrub Panicum.
4. *Ajuga australis*, Australian Bugle.
5. *Hibiscus trionum*, the Bladder Ketmia. This is a native species of Hibiscus, widely spread over the warm temperate parts of the world. It is very common in some parts of Western Queensland on the black soil plains. It is rather a pretty little plant in flower.
6. *Indigofera hirsuta*, Hairy Indigo. Sometimes called Wild Lucerne, but this is a name applied to several leguminous plants in Queensland.

We shall always be pleased to name and report on any specimens or plants you care to send. The local names in use in your district are very acceptable.

Batswing Coral—Honey Locust.

S.R. (Maryborough)—

1. *Erythrina verperbillia*, the Batswing Coral, so called owing to the shape of the leaflets. It is a native tree with a wide distribution in Queensland, occurring both on the coast and inland. The bark is thick and corky and the wood is exceptionally light, hence the tree is often known as Corkwood. This name, however, is applied to a number of trees in Queensland with rather light woods and soft, corky barks.
2. *Gleditsia triacanthos*, the Honey Locust. A native of North America, much planted in temperate and sub-tropical countries as an ornamental tree. The large pods it yields have considerable value as fodder for stock. The flowers have considerable value for honey-producing purposes.

Love-in-a-Mist Passion Vine—Cockatoo Apple—A Native Grape Vine.

W.M.P. (Murray's Creek, N.C.L.)—

1. *Passiflora foetida*, Love-in-a-mist Passion Vine. A native of South America, now widely spread over the tropics and sub-tropics of the world. The ripe fruits are often eaten by children, but when unripe they are dangerous as they contain a prussic acid-yielding glucoside. The plant has been widely cultivated in tropical countries as a green manure and smother crop, being largely grown in some tropical places under rubber trees to smother out more vigorous and rank-growing weeds.
2. *Careya australis*, the Cockatoo Apple. This plant is very common in coastal Queensland from Wide Bay northwards, and extends up to New Guinea. It has been looked upon as harbouring the fruit fly, but the fly contained in it is a different one from the species that infests cultivated fruits. You call it Kangaroo Apple. This name more correctly belongs to another plant—*Solanum aviculare*—but local names change a good deal according to the district.
3. *Vitis opaca*, a native Grape Vine. The roots sometimes form large underground tubers, but we do not know if these have any food value.

Cassia and India Rubber Vine.

F.R.D. (Barcaldine)—

The shrub is *Cassia notabilis*, a plant of the Senna family. It is not known to be poisonous to stock, but they do not seem to eat it. If they did, like others of the same genus, it would probably be a purgative. The present species has not come under notice as a pest, but many *Cassias* are capable of overrunning the country if left unchecked. We previously received specimens of this plant from you in the spring of 1927.

The plant with the curious double seed-pod is *Cryptostegia grandiflora*, an india-rubber vine. A pamphlet on it has been forwarded.

Burr Vine.

H.P. (Stanthorpe)—

The specimen is *Carissa ovata*, commonly known in Western Queensland as a Burr Vine; not a particularly good name, as the plant is hardly a vine but a shrub. Berry Bush is another name applied to it. It has some reputation as a fodder in spite of its thorny nature. It should be possible to grow it in the Stanthorpe district, but in its natural state it generally seeks the shelter of native scrub. The plant is propagated from seeds, which, if we remember rightly, set some time in the winter months.

PIG RAISING.

From the outgoing mail of the Instructor in Pig Raising, Mr. E. J. Shelton.

Sick Pigs.

E.B. (Mallanganee, N.S.W.)—

The pigs are suffering from infection by stomach and intestinal worms, as well as from severe indigestion and malnutrition, all the result of improper feeding, and by exposure.

The fact that these pigs do very well until they are about three months of age shows that this is the period during which they receive a liberal supply of natural food from the sow, but when this supply is cut off and the diet is changed, indigestion is set up and the resultant disorders check growth and produce the pot-bellied, slow-growing stock to which you refer.

These matters are treated very fully in a number of pamphlets we are posting to you under separate cover, so we need not refer to them fully here, but would add that every effort should be made to accustom the young pigs before weaning to the same class of food as that on which they will have to depend after weaning. If this is done there will not be any serious check in growth at weaning time.

Infestation by these worms results from the young pigs picking up the worm eggs while suckling; the worms develop rapidly in the young animal and soon cause a serious check in development. See reference to treatment in pamphlet on "Paralysis in the Hindquarters." See also leaflet "Diarrhoea or White Scour in Young Pigs," for this treats also on constipation, from which it is evident your pigs are suffering.

We strongly recommend you to try some protein meal and some bone meal and lime water in the food given to these young pigs and see also that they have their food in a quiet corner where they can feed without disturbance by older stock, as they are too young to be able to successfully fight against older stock in the rush for food. Succulent greens and an abundant supply of clean drinking water are essential to the rearing of young pigs, while balanced rations only should be fed. See pamphlets also for treatment of skin parasites, for it is possible the young pigs may be infested with hog lice.

Pig Standards.

P.G.R. (Goodger, Nanango Railway)—

At the several meetings of the Queensland Pig Industry Committee the matter of a standard carcase of pig most suitable for the local bacon trade has been dealt with

The ideal bacon pig as required by factories and the trade in this State is a prime quality, medium condition, fleshy animal not exceeding six months of age and from 95 to 120 lb. weight dressed, approximately 136 to 170 lb. live weight. There is no market for very heavy, fat pigs or for pigs in an overfat condition even if they are of correct weight and type. Hence the greatest care must be taken in having bacon pigs in prime condition and not over the specified weights.

From the copy of the February issue of the "Queensland Agricultural Journal" forwarded with other pamphlets under separate cover, you will note the scale of weights and current prices being paid for bacon pigs in this State and remarks thereon, and we hope you will bring these matters before your members and urge all those who are not already subscribers to the "Queensland Agricultural Journal" to send along their shillings (it costs the farmer only a shilling a year for postage) and have the Journal posted regularly. Copies of the article dealing with the Economic Phases of the Pig Industry are being sent to every known pig producer through the various butter factory organisations, but if any of your members are not dairying and should like a copy of the pamphlet, we shall be glad to supply it.

Bacon Curing on the Farm.

L.P.A. (Bouldercombe, Rockhampton)—

The secrets of success in the curing of bacon are:—

- (1) The correct weight, type and condition of the bacon pig.
- (2) Correct preparation for slaughter by restricting the feeding and resting the animal twenty-four hours beforehand.
- (3) Absolute cleanliness and complete control of temperature throughout the process of curing.

The reason the factories can successfully cure bacon and ham without the necessity of removing the shoulderblade and opening up the stifle joint in the ham is that they are able to thoroughly chill the carcass after having allowed the animal heat to pass off. They also have complete control of the temperature both day and night, week in and week out, and can thus keep the meat in temperature of around 42 degrees Fahr. during the whole of the time it is in the curing cellars. They also have proper rooms for thoroughly drying the meat preparatory to and for smoking after the drying process is complete.

The trouble with curing bacon on the farm, especially in warm climates, is that the temperature varies so much from day to day and from morning to evening that it is not possible to check decomposition to the same extent as it is where continuously low temperatures prevail, as they do in the factory cool rooms. We doubt very much whether it pays farmers to attempt the curing of their own bacon, unless they have specially constructed cellars or rooms where there is a continuous draft of cold moist air, for moisture is as essential to success as low temperature.

If your members clubbed together and sent in a consignment of suitable pigs to the bacon factory either at Rockhampton or Maryborough or other centre, we feel sure the factory management would willingly undertake at your risk the curing and final delivery of the products of these pigs, charging working expenses only on the consignment; at any rate it would be worth enquiring into. You will realise the factory people are not very keen on the matter of curing for individual shareholders as it means too much expense in handling each man's bacon and they do not consider the resultant bacon would be any better than the average bacon, ham, etc., manufactured at their factory and which is available to shareholders at wholesale rates in sides, flitches, middles or hams.

We shall be glad to advise you fully on any other points on which your members require detailed advice.

Salt, sugar, and saltpetre are the best preservatives to use in the curing of bacon. The use of boric acid or commercial preservatives is not generally recommended; in fact, for British markets and overseas trade the use of preservatives like boric acid is strictly prohibited. Preservatives like this will not check decomposition unless the temperature of the room in which the meat is cured (or of the brine) is low enough; in fact, they are only of value under conditions favourable to the curing of bacon without the addition of these acids.

Sunflower Seed for Pigs.

"INQUIRER" (Brisbane)—

Regarding the use of sunflower seed as a food for pigs, and our suggestion that a very limited proportion of seed—2 per cent. or so—should be added to the ration, it might be as well to point out that a larger proportion of seed, up to 10 per cent., could be used without materially affecting the growth of the young stock. Both the seed and the plant itself are looked upon by authorities here and in other parts of the world as of lower food value than maize, or the better grades of sorghum, and it is quite apparent that it would not pay to grow sunflowers specially for stock feeding purposes. One American report indicates that equal parts of corn and sunflower seed were fed to pigs in conjunction with other foods with good results, but there does not appear to be any clear indication as to the nature of the other foods or the relative proportion. Another report states that sunflower seed may be classified as of similar value to linseed, but here, again, it is very doubtful whether it would pay to grow linseed as a stock food unless the grower was prepared to experiment and take his chance with the results. In his "Stock Foods" pamphlet, Mr. Brunnich, the Agricultural Chemist, states that sunflower seeds and sunflower oil cake, if procurable, are excellent foods suitable for all kinds of stock.

General Notes.

Examinations under "The y Produce Act of 1920."

July 13th has been fixed for the holding of the annual examinations in the theory of Milk and Cream Testing, Milk and Cream Grading, and Butter and Cheese Making. These examinations were held previously during the months of October or November.

Watering Horses.

Horses require anything from 5 to 15 gallons of water a day, the quantity depending on the temperature and the amount of work performed. The water should be as pure as possible, clear in appearance, and free from taste, colour, or smell.

Pure water is just as essential to a horse as it is to a man, and it is a mistake to suppose that a horse can drink badly-contaminated water with impunity. Water obtained from pools or shallow wells, contaminated with surface drainage, or containing decomposing organic matter, frequently causes diarrhoea, and generally predisposes to colic. Water that contains a large amount of sediment should not be given, as the sediment causes a mechanical irritation of the mucous membrane of the stomach and intestines—i.e., sand colic. When the horse is at rest in the stable, water should be given three times a day, and should invariably be given previous to feeding.

Staff Changes and Appointments.

The following appointments have been made in the Agricultural Bank:—

Mr. E. W. Everett, Inspector, to be Senior Inspector, and the undermentioned Inspectors to be District Inspectors:—Messrs. A. Harrison, J. F. Smith, G. H. B. Watson, W. S. Robinson, R. J. Calder, C. S. Ross, and E. W. Wanstall.

These appointments will take effect as from 1st May, 1929.

The appointments of Messrs. S. A. Green and D. McLaurin as Inspectors under the Diseases in Plants Acts have been confirmed as from 1st November, 1928.

The appointments of Messrs. S. G. Allan and J. A. Kerr as Inspectors under the Diseases in Stock Act have been confirmed as from 30th October, 1928.

The appointment of Mr. F. C. Coleman as Inspector under the Dairy Produce Act has been confirmed as from 15th October, 1928.

Mr. F. C. Shaw has been appointed Temporary Inspector of Stock, Maryborough, from 2nd April, 1929, to 27th April, 1929.

The resignation of Mr. L. L. Gudge, as Cotton Classifier and Salesman, as from the 6th March, 1929, has been accepted as tendered.

Honey Board Election.

The first election in connection with the appointment of four growers' representatives on the newly constituted Honey Board resulted as follows:—

| | Votes. |
|---|--------|
| H. E. Fagg, Killarney South | 222 |
| E. Pickering, Eumundi | 210 |
| R. V. Woodrow, Woodford | 200 |
| J. Schutt, Holstein Park, via Dalby | 179 |
| H. L. Jones, Goodna | 168 |
| A. Gambling, Raceview, via Ipswich | 82 |
| H. E. Golder, Milmerran | 74 |
| J. T. Biggs, Caboolture | 64 |
| J. M. Petersen, Morayfield | 64 |
| M. Peake, The Gap | 42 |
| A. F. Spry, Clayfield | 30 |
| C. F. Spry, Rocklea | 24 |

Messrs. Fagg, Pickering, Woodrow, and Schutt, together with the Director of Marketing, will therefore be appointed members of the Board, and will hold office for a term of one year.

Wheat Board Referendum.

A poll to decide whether the State Wheat Board should be brought under the provisions of "*The Primary Producers' Organisation and Marketing Acts, 1926 to 1928*," or remain as at present under "*The Wheat Pool Acts, 1920 to 1925*," was conducted on the 22nd April. The voting was as follows:—

| | |
|--|------------|
| For the proposal to declare wheat a commodity under the Primary Producers' Organisation and Marketing Acts | 622 votes. |
| Against the proposal to declare wheat a commodity under the Primary Producers' Organisation and Marketing Acts | 867 votes. |
| The proposal will consequently lapse. | |

"ABC of Queensland and Australian Statistics."

The Registrar-General (Mr. Geo. Porter) has forwarded us a copy of the 1929 Edition of his "*ABC of Queensland and Australian Statistics*." This book contains a wealth of statistical and other information, but at the same time is of a handy size and easily carried in the pocket.

Besides presenting statistical facts in an interesting and useful form, it contains much general information which will prove useful to almost any class of person. For instance, there are among other things Location of Public Offices; Consular Representatives; Registrar-General and Registrar of Friendly Societies' Fees; Public Curator Fees; Fees under Real Property Act; State Duties; License Fees (State and Federal) including Customs, Fishing, Timber, Traffic, Wireless, Wine, Beer, and Spirits, and others; Company, Shop and Factory Registration Fees; Federal and State taxation information; Main Roads Regulations and Fees; Post Office Charges, &c.

New statistical features have been added this year touching on topics of general interest, such as—Area, Yield and Value of Australian Fruit Production, Oversea Trade, Value of Production, Greater Brisbane Finance, Oil Boring Companies, Industrial Accidents, Membership of Industrial Organisations, Unemployment, Census Population and Expectation of Life. At the same time the volume retains all of the features incorporated in previous issues, and all figures quoted were the latest available at time of going to press. A map and geography of Queensland, a graph showing Principal Agricultural Yields, and information concerning world population and products are included, besides Statistical Tables giving facts concerning Agriculture, Live Stock, Land Settlement and Tenure, Banking, Building, Local Government, Manufacturing, Retail and Wholesale Prices, Cost of Living, Purchasing Power of Money, Rates of Wages, Industrial Courts, Industrial Disputes, Education, Election Results, Public Finance, Taxation, Friendly Societies, Hospitals, Life Insurance, Law and Crime, Local Option Polls, Meteorology, Mineral Production, State Enterprises, Trade, Shipping, Motor Vehicles, Post and Telegraphs, Wireless, Railways and Tramways, Traffic Accidents, Births, Deaths, Marriages, Divorces, Infant Mortality, Population, and Migration. This book should be of real interest to all.

Wheat-growing Competitions—Factors in Increased Yields.

Frequent and judicious working of the fallows, coupled with liberal use of graded seed and superphosphate, are the factors largely contributing to the increased yields in the various crop competitions in the Parkes (N.S.W.) and adjacent centres, according to the judges' summarised report.

In 1926, it is stated, the fallows producing the leading seven crops and the twelve supplementary crops were worked 6.6 and 4.75 times, respectively, an increase of 1.85. In 1927, the times worked were 8.4 and 4.9, an increase of 3.5 times, and this year (1928) 9 and 6.6 times, an increase of 2.4 times. The average number of workings in 1928 was greater than in 1927 or 1926.

The use of superphosphate shows a continued increase, the amount being 73 lb. per acre, for the leading seven crops of 1928. There has been no increase in the amount of seed sown, which is still about 1 bushel per acre.

It is noticeable, remark the judges, that diseases are becoming less menacing under scientific farming. In the central-western district this year flag smut was the only disease at all prominent. Foot rot and take-all were not much in evidence, while copper carbonate has effectively controlled bunt. Almost without exception this season the seed was treated with copper carbonate. How this treatment of seed wheat has grown in favour in recent years is well demonstrated by statistical records, which show that in 1924 only 40 per cent. of the competition crops were so treated, while in 1928 the percentage had increased to 97.

Egg Board Levy.

Regulations have received approval under "*The Primary Producers' Organisation and Marketing Acts, 1926 to 1928*," empowering the Egg Board to make a levy on all persons delivering eggs to such Board, the levy to be at the rate of $\frac{1}{4}$ d. per dozen eggs so delivered as from 1st January, 1929, to 31st December, 1933. This levy is to be used by the Egg Board for administrative purposes.

Getting Land Ready for Fruit Trees.

Preparation of the land for planting of fruit trees should be painstaking and thorough. Ploughing must be to a sufficient depth, sufficiently depending upon the nature and depth of the soil and the nature of the subsoil. The soil should be thoroughly broken up, and allowed to remain in the rough, so that, exposed to the beneficial influences of sun, rain, air, and frost, it may be sweetened and improved in its chemical content, and so that it may absorb and hold the winter rains. Later, as a result of the influences referred to, it will respond to the orchardist's efforts to induce a good tilth.

In localities where autumn is mild and frosts during that season are unknown, citrus trees may be planted during the month of April. Injury to roots and the drying of the roots during the process of planting should be avoided. It will be necessary to water newly-planted trees in dry soil, thus helping them over the critical period of establishment in their new position. Loss of soil moisture is lessened by the beneficial process of mulching. Do not place undecomposed manure in contact with the roots. Manure, if used at the time of planting, should be thoroughly mixed with the soil. When reffills are being planted a large hole should be dug and filled with fresh soil.

Common Cream Defects—Causes and Remedies.

How to guard against the defects commonly found in cream is a matter of considerable financial importance to the dairy farmer. In the following paragraphs are discussed a few of such common faults, their causes and remedies.

Over-ripe Cream.—This is caused by the cream developing excess acidity, by skimming cream too thin, or by infrequent deliveries to the factory. Do not skim cream below 40 per cent. test in spring and summer, or below 36 per cent. test in autumn and winter. Cool and aerate cream on the farm. Deliver to the factory frequently—not less than four times weekly.

Staleness.—Caused by holding cream too long at the dairy. Often the balance after filling the cream can is held until the next delivery, and held at too high a temperature. The remedies are to send all the cream in the dairy on days of delivery, and to keep creams cool while on the farm.

Ropy Cream.—Due chiefly to bacteria in water supplies, especially in swamps, stagnant dams, &c.; also due to unclean, dusty yards and bails, dairies and utensils. Cows should be prevented from wading in stagnant waters, and the udders of the cows should be washed and wiped before milking. Premises and utensils should be kept clean. This defect is very difficult to overcome, unless clean methods generally are adopted in dairy work. Use soda when washing utensils, and boiling water to scald all utensils. At least once a day remove all cow droppings 100 feet from dairy, yards, and bails.

Curdy Cream.—Due to skimming cream too thin, to keeping cream at high temperatures, or to adding warm cream to cool cream. Skim cream from 38 per cent. to 42 per cent. fat test. Keep cream cool. Mix warm cream with cool cream only after animal heat has been reduced; give the whole an occasional stir to make the mass uniform, and stir at least four times daily.

Fermented Cream.—Due to the development of bacteria, mostly the result of unclean methods in dairy work. To remedy the condition give strict attention to cleanliness in plant and premises, using boiling water mornings and evenings, and see that the udders of the cows and the hands of milkers are washed. Skim the cream not less than 38 per cent. test, and mix creams only at cool temperatures.

Cow Flavour.—Due to unclean condition of bails and yards, especially in wet weather; also to milking unhealthy cows, and milking cows too soon after calving. Cleanliness of bails and yards should be the order of the day. Never use milk from sick cows, or from cows too soon after calving.

Rancid Cream.—Due to over-staleness, the result of not delivering to the factory frequently enough. This class of cream is liable to be condemned, being unfit to manufacture into butter. Cleanliness must be observed, with frequent delivery to the factory.

Clean up of Vegetable Plots.

Clean cultivation is of considerable significance in the combat of the various pests of field, garden, and orchard.

It is an important factor in the control of cabbage moth, for instance, and one that cannot be too strongly emphasised. It is often the practice to leave all unsaleable cabbages or cauliflowers, or the stumps from which the "heads" have been cut, in the ground long after the crop has been harvested. This provides a continuous breeding ground for the moths, which infest the young plants as soon as they are put out—very often alongside the abandoned plot. All useless plants and stumps should, therefore, be cleaned up and properly destroyed as soon as the crop is harvested.

The same reminder may be given with respect to the pumpkin beetle, a pest so prevalent this season. A few years ago it was discovered that the larvæ of this beetle infest the roots of pumpkins. All dead pumpkin and melon plants, therefore, should be cleaned up and burnt.

The Royal Society of Queensland—Report of Council for 1928.

Thirteen original papers were read before the Society and published during the year. Three public meetings were held. On 10th July, 1928, Dr. C. M. Yonge, leader of the Great Barrier Reef Expedition, Dr. Stephenson, and Messrs. Tandy and Russell outlined the work contemplated. On 16th July, 1928, Sir Arnold Theiler gave an address on "Problems of Phosphorus Deficiency of Stock." On 4th March, 1929, Professor Johannes Schmidt, D.Sc., Ph.D., Director of the Carlsberg Laboratory, Copenhagen, and leader of the Danish Oceanographical Expedition, delivered a lecture on the life history of the eel.

The Council wishes to acknowledge generous subsidies amounting to £147 from the Queensland Government towards the cost of printing the Proceedings of the Society. Appreciative acknowledgment is also made to the University of Queensland for housing the library and providing accommodation for meetings.

The membership roll consists of 4 corresponding members, 6 life members, and 176 ordinary members. During the year there were five resignations, and nine new members were elected. The deaths of Dr. J. V. Danes, of the Czech University, Prague, a corresponding member, and of Mr. W. R. Colledge, a past president of the Society and a frequent contributor to the proceedings, are reported with regret. Mr. Rowland Hildge, a former honorary librarian of the Society, has been lost from the ranks of Queensland biologists by death.

Green Coloration in Wool—Investigations into Cause.

Though distinctly uncommon, it is not a very rare thing to see wool which shows a greenish discoloration, and at times a reddish coloration has been observed. The discoloration may affect the whole length of the staple or only part, and sometimes may occur as bands across the staple (states an article in the "Agricultural Gazette" of New South Wales). It is said to be most commonly met with in wool from the tablelands, and it is understood that the wool is looked upon unfavourably by buyers owing to the colour remaining steadfast after scouring.

Recently a sample from the Monaro district was submitted to Glenfield Veterinary Research Station for examination, and as a result it was possible to confirm a previous observation that the production of colour was due to the growth of a pigment-producing bacterium. Not only was the bacterium readily cultivated from the sample in question, but the condition has been reproduced experimentally on the back of sheep.

It was found that the bacterium in question requires a considerable amount of moisture for its growth, and appears to grow better on fine than on coarse wool. When very old, the colour turns a brownish red, but the green colour can be restored by the addition of alkali, and, conversely, the green colour becomes red on the addition of acid. It would thus appear that if there happens to be an acid-producing organism, the wool may take on a red colour. Thus both types of discoloration may be induced by the growth of the same organisms.

The green-producing bacterium is not a very uncommon organism, and at times gets into wounds, probably from dust. It would seem, therefore, that if it gets a lodgment on the skin of a sheep and the conditions are suitable for its growth, that is, if the skin is scurfy and there is sufficient moisture, it may lead to this discoloration of the wool. Such conditions might well exist at times in tableland country with heavy rainfall, and it is to be noted that it is said that the condition is seen chiefly in sheep from such localities.

A Southern Dairy Farm Competition—Points from the Report.

In inaugurating a dairy farm competition the Murrumbidgee Pastoral and Agricultural Association was responsible for something in the nature of an innovation in the dairying industry. Seven farms were submitted for judging, points being awarded under a schedule, the main headings of which were conservation of fodder, character of the herd, and layout of the dairy and farm. Mr. A. R. Martin, whose farm is situated on the Murrumbidgee River, about 12 miles west of Wagga, was the winner, scoring 1,115 points out of a possible 1,250. The following notes, which should be of interest to others besides those competing, are taken from the judge's report.

With reference to fodder conservation (the importance of which was so generally recognised by competitors that the average score was 230 points out of a possible 300), it is remarked that if full returns are to be obtained from dairy cows they must be well fed during the whole of the lactation period—that is, usually for about nine months after calving. If feed is scarce at any time during that period, the milk flow, and consequently the factory cheque, will decrease. In no part of New South Wales are the natural pastures sufficient for nine months on end, so that the growing of crops and the conservation of fodder are necessary if full returns are to be obtained from dairying.

The ideal fodder for dairy cows consists of a mixture of grasses and clovers in bloom, such as is found in the Wagga district in late winter and spring. This provides naturally a balanced ration; that is, one in which the different ingredients are in the proportions which can be most economically made use of by the cow. The ingredients referred to are protein, the flesh-forming substance, and carbohydrates and fat, which provide heat and energy. Protein is the most expensive ingredient of food to provide, the value of a fodder usually being judged by the quantity of protein it contains. In this respect the Wagga district is fortunate in that the basis of feeding on nearly all farms is lucerne, which contains more protein than any other common fodder.

Lucerne alone, however, does not provide a balanced ration, being deficient in carbohydrates, and it therefore requires mixing with fodder rich in carbohydrates, and the cheapest and most plentiful fodder of that nature in this district is oaten or wheaten hay or chaff. For example, if a cow were fed a ration of 30 lb. lucerne hay or 30 lb. oaten hay per day, in neither case would a balanced ration be provided, too much of certain ingredients being supplied and not enough of others. The yield therefore would suffer. But if a mixture of 15 lb. lucerne and 15 lb. oaten hay or chaff were fed a fairly well-balanced ration would be provided. This is a matter that is not very well understood, there being a tendency to feed only one fodder at a time.

The owners of all competing farms were impressed with the necessity for improving pastures, mainly by top-dressing, and to a lesser extent by the sowing of improved pasture plants, such as subterranean clover and rye grass, proceeds the report. Of green crops, lucerne, of course, always has pride of place, but many areas of Sudan grass were seen to be suffering severely from the dry weather and in some cases germination was very patchy. This makes one wonder why dairy farmers do not go to the trouble of following a small area for summer fodder each year. Sudan grass is a valuable fodder, but it cannot be sown until the ground is warm, and when sown on freshly ploughed ground in a dry spring is bound to suffer severely.

As to the herds, farmers generally are stated to be keen to develop them along the right lines. The importance of a purebred bull is realised, but it is still more important, it is pointed out, that he have behind him a record for production which he will transmit to his daughters—the herd of the future. Unfortunately there are many purebred bulls whose presence in the herd is more likely to have a deteriorating than an improving effect on butter production. Unless the sire of the herd comes from tested stock whose records are known, there is no certainty that his progeny will be better than their parents as dairy animals.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

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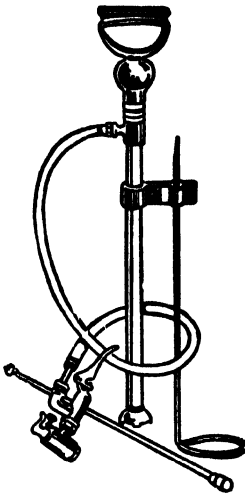


FIG. 510

As the illustration shows, Fig 468 is a type that can be used as a bucket pump or in conjunction with a knapsack. *Double acting, high pressure, easily operated.*

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FIG. 468



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The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.

What should Baby Weigh.

What should baby weigh? The answer to this question, so often asked by mothers, depends on many factors besides baby's age. The mother is prone to base her idea of what her child should weigh on the weight of a friend's or neighbour's baby, and she not infrequently thinks that her own infant suffers by the comparison. Because her baby is smaller, the opinion is formed that he cannot be getting sufficient food, or, what is worse, that her milk is not agreeing with him. In her anxiety that he should thrive, the mother is tempted to wean him, and give him some artificial food. Perhaps, unconsciously, her mind has been influenced by frequently seen glowing advertisements of patent foods, accompanied by photographs of big, fat babies. and the anxious mother thinks that the food which produced such results in other children must also be good for her baby. What she does not realise is that patent food-fed babies, though often very fat and heavy, are frequently flabby, and in other respects not as healthy as the child who is fed by his mother. So her baby is weaned, and deprived of the food which, above all others in the world, is best for him.

Only too often serious digestive upset follows, especially if the weaning is done during the summer months, when there is the risk, not only of upset due to changing the food, but also the danger of infection with dysentery, which occurs every summer in Queensland.

In judging what a baby should weigh, consideration should be given to more than merely weight for age. A little knowledge of some of the factors to be taken into account may save some mothers from anxiety, and some babies from being robbed of their mothers' milk.

The average baby, at birth, weighs 7 lb.; boys usually weigh a little more than girls. During the first week of life there is almost always a loss in weight, but by the time baby is a fortnight old, he has, as a rule, regained his birth weight. Sometimes it takes a little longer—perhaps three or four weeks—for him to regain this weight, and if this happens it need not cause anxiety if the infant appears well. But, at any rate, at the end of a month, the baby who fails to gain weight must be taken to a doctor or a welfare nurse. It may be that baby is getting insufficient food, or too much food, in which case the nurse will be able to help or advise, but some infants need medical attention. The average healthy baby at the end of a fortnight has regained his birth weight, and from this time on he should make steady progress. In the first three months he gains weight more rapidly than at any later period in the first year. His gain should be from 4 to 8 oz. each week. By the time he is three months old this rapid gain is slowing down a little, and the average gain for the next three months is from 4 to 6 oz. weekly. When baby is from five to six months old, he has doubled his birth weight. After that time there is again a slowing down, and from then until he is twelve months old the gain is about 1 lb. a month. At twelve months the birth weight is usually trebled, and the child weighs about 20 or 21 lb.

All these figures apply to the average normal baby, but every baby must not be expected to conform to them. There are exceptions, even among seemingly normal babies, and those who obviously differ from normal must be expected to differ from normal standard.

Take, for example, the baby who is under weight at birth. The infant who weighs, say, only five pounds, cannot be expected to gain as much weekly weight as the one who was seven pounds when born. A smaller gain would, in this case, be perfectly normal, and quite satisfactory. Baby started life weighing two pounds less than usual, and, though thriving, may throughout the first year remain so much below average weight; though sometimes these children gain more than usual in the latter part of the year, and by the time they are twelve months old reach normal weight.

Similarly, the baby who weighs nine or ten pounds at birth may continue above average weight for a time, but later the weekly gain will probably be less than usual, and this child also at twelve months tends to reach the average of twenty to twenty-one pounds.

The child of very small parents would naturally be small framed, and consequently, throughout the first year and later, tend to weigh less than normal.

The child who is fed on his mother's milk is most likely, other things being equal, to make uninterrupted and regular gain. The bottle-fed baby, if weaned when very young, as a rule gains weight slowly at first. Even when fed on the proper quantity of a good artificial food, the digestion has to become accustomed to the strange food, which could not be expected to suit it as well as mother's milk.

Overfeeding will cause a baby to gain weight rapidly for a time, but this is frequently followed by indigestion, which later may cause failure to gain, or even loss of weight. Mothers should guard against giving extra food merely with a view to increasing the baby's weight. In addition to the risk of causing indigestion, and general upset, there are other disadvantages. The baby who is "out of sorts" from indigestion is much more likely to contract infection than the healthy infant. Also, the very heavy baby does not sit up, crawl, or walk as early as the average child, and consequently needs more attention for a longer period.

Temporary mild indisposition, for example, a common cold, may be responsible for failure to gain weight for a week or so. It is often noticed that baby does not gain just when a tooth is being cut, when changing from one food to another, or during weaning. Some babies gain unequally; that is, they may gain more than the average one week, and not at all the next. This need cause no anxiety. Steady, regular weekly gain is best, but there is no need to worry over some irregularity in gain, as long as baby looks well, is happy and contented, and is sleeping well at night.

The important thing for baby, during his first nine months, is not that he should weigh more than usual, but that he should make steady gain, when fed on his mother's milk. So treated, he has the best chance of being strong and healthy, not only during his first year, but also during subsequent years.

THE HOME BEAUTIFUL.

BRIGHTEN THE HOUSE WITH COLOUR AND INCREASE EVERYONE'S HAPPINESS.

Surely in these modern days there is no woman that does not wish to make her home more beautiful. Since few of us can afford entirely to refurnish our homes or even a single room, it comes as welcome news that any shabby, out-of-date room, can be transformed into real loveliness by simple methods and small expenditure.

In answer to a mood of new things, or a desire that your house should look at its best, all you need is to start beautifying something, anything, that you already have.

Bring colour into your home and the shabbiest and most commonplace surroundings will create a very different impression. Colour, new arrangements, and thought given to detail will beautify any house that appears drab and has become out of date—and without discarding existing furniture. Colour is cheap, offering itself in cretonnes, plain stuffs of gay colours, and most inexpensively in the brushing lacquers that are now obtainable. New arrangements are cheap, too, for it costs nothing to try table, chairs, and sofa in a new cosy grouping or experiment with a different placing of the bedroom pieces.

Of course, the smartness of freshly tinted walls plays an important part in the quick and cheap transformation of any room, but there is nothing like a new floor-covering to add charm to some shabby room. Indulge in a colourful rug or lino square and lacquer the floor surrounds and skirtings with a colour to tone in. Then with the right window treatment—perhaps the old curtains dyed to the correct shade—and you have gone a long way towards gaining a maximum effect at a very moderate cost.

How about the furniture and the little things that mean such a lot in the general colour scheme? It is here that the modern brushing lacquers present

such wonderful opportunities for the woman with ideas. The "wet paint" bogey need no longer frighten you, or the lack of painting experience cause you to hesitate, for these lacquers dry while you are admiring what you have done and go on so smoothly that there are no ripples or marks of the brush in the finish, even though it may be your first painting job.

Picture the old bedroom furniture in a new coating of pale green, shell grey, or a delicate pink, a pretty lamp shade quickly made, a gay rug, and the cushions recovered. Very little expense, but a veritable picture of daintiness. Bathroom fittings of jade or turquoise in place of the white we have seen so long, and dozens of ideas for bringing colour beauty into the home that pop into your mind directly you think of it. To mention specific colour schemes is unnecessary, for every woman possesses a latent talent for using colour to its best advantage and the great charm of home decoration is to introduce individuality into every room.

Possibly the kitchen gives the greatest scope for showing what can be done, and it is only fitting for the joy of colour to smile back at you in the place you spend so much of your time. Why endure scratched or plain hungry wood that requires so much scrubbing when it can so easily be lacquered and made easy to keep clean. Let the chairs, table, dresser, draining-board, cupboard, and woodwork radiate with cheery colours and create an atmosphere that will banish the air of drudgery so often apparent in the kitchen. The bread crock, tea-tray, canisters, and the many articles of everyday use, right down to the dustpan, can be artistically decorated and help the general impression of brightness.

When you have seen what the magic of colour has done for the kitchen, go through each room, adding the touch of colour you know should be there, and you will find that this business of cheering up your home with colour is not only an easy way to achieve permanent loveliness, but that it is great fun as well.—
"The Farmer and Settler."

WHY NOT ELEVATE THE KITCHEN.

"There is nothing wrong with labour-saving or with matters connected with the home; the whole history of civilisation has been built up by the food we eat and might well be written from that aspect. Archestrates realised this in Ancient Greece, and his lost epic on the subject is considered by learned men and women one of the greatest losses learning and civilisation have suffered. Household equipment in the same way has formed the starting-point of many a modern scientific invention. Watts' steam kettle is a well-known instance; there are very many less known, or still unnoticed. We ought to try to raise the interests of home-workers instead of keeping them in the condition of unlettered, unambitious slavery. The status of domestic work in this country is a disgrace to the emancipation of women. Only a certain section of women has been freed from slavery, and I am often tempted to think those who have thus freed themselves are unwilling to emancipate the home workers because they want to keep their services in the home for themselves, so that they, the emancipated, may be free to devote themselves to higher interests. This is exactly the attitude of men in 1850. The truth is all work, whether in the home or outside, may be degraded or elevated according to the amount of intellect, moral effort, and spiritual or scientific significance, applied to it."—Ann Pope, in "The Woman's Leader."

CREATIVE GARDENING.

Gardening is a pleasant pastime, but do not overburden yourself by attempting to cultivate too large a garden. Immediately you do this your work becomes a drudgery and the charm is lost. To take a plot of ground, barren it may be, rough, and rugged, and neglected, a mere weedy waste without form in design or any attractive features whatever, and to convert it into a little world of beauty and fertility is one of the most delightful achievements it is possible to attempt.

"Pictorial Gardening" says: "It is delightful, because in the best sense of the word it is natural. There is something in the very breath of the soil that gives tone and health to the body and mind. There is wholesome inspiration in the feeling that in labouring to bring out in your ground the utmost beauty of which it is capable you are working in immediate co-operation with sunbeams and breezes and showers, and with that beneficent power behind them which seems always to be striving everywhere to clothe the whole world with what is lovely and productive.

"To work out under the open sky, amid sunbeams, and winds, turf, and flowers, and twittering birds, and to fall into line with the principles of life that nature is

everywhere illustrating and enforcing around you, can hardly fail every now and again to bring you very near in thought and feeling to the Creative Power throbbing and pulsing in every blade and leaf about you.

"As you go on your love of all that is fair and beautiful in the natural world around you will increase, and if you are tolerably easy in mind, simple and natural in your tastes, and have a very moderate endowment of the imaginative, then the hours in your garden will not only be amongst the most delightful of your life, but in the best sense they will also be amongst the most profitable, benefiting the very nature of you."

KITCHEN GARDEN.

Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; and in cool districts horse radish can be set out.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

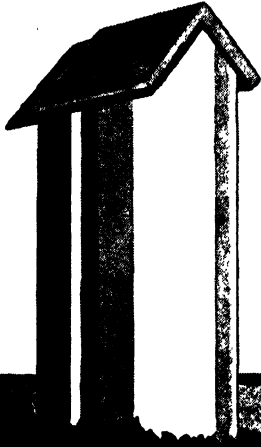
Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.

No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist spring-time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the summer bedding plants may be propagated.

Sow first lots, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground. Many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondii*, stocks, wallflower and zinnias, &c., may be sown either in boxes or open beds. Mignonette is best sown where it is intended to remain. Dahlia roots may be taken up and placed in a shady situation out of doors, plant bulbs such as anemones, ranunculus, frezias, snowflakes, ixias, watsonias, iris, narcissus, daffodil, &c. The Queensland climate is not suitable for tulips.

To grow these plants successfully it is only necessary to thoroughly dig the ground over to a depth of not less than 12 inches, and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should be raked over smoothly so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave the plants (if in the border) at least 4 to 6 inches apart.



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Molly Sharman Crawford, White.
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Farm Notes for June.

FIELD.—Winter has set in, and frosts will already have been experienced in some of the more exposed districts of the Maranoa and Darling Downs. Hence insect pests will to a great extent cease from troubling, and weeds will also be no serious drawback to cultivation. Wheat sowing should now be in full swing, and in connection with this important operation should be emphasised the necessity of at all times treating seed wheat by means of fungicides prior to sowing. Full directions for "pickling" wheat by copper carbonate treatment are available on application to the Department of Agriculture, Brisbane. Land intended for the production of early summer crops may now receive its preliminary preparation, and every opportunity taken advantage of to conserve moisture in the form of rainfall where experienced; more particularly so where it is intended to plant potatoes or early maize. Where frosts are not to be feared the planting of potatoes may take place in mid-July; but August is the recognised month for this operation. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them under cover and in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sandpit. Before pitting, spread the tubers out in a dry barn, or in the open if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size, and finally cover with either straw or fresh hay. The sand excludes the air, and the potatoes will keep right through the winter. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be uncarthed. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas.

Cotton crops are now fast approaching the final stage of harvesting. Growers are advised that all bales and bags should be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus address labels.

Orchard Notes for June.

THE COASTAL DISTRICTS.

The remarks that have appeared in these notes for the past two months apply in a great measure to June as well, as the advice that has been given regarding the handling, grading, packing, and marketing of the citrus crop still holds good. As the weather gets cooler the losses due to the ravages of fruit flies decrease, as these insects cannot stand cold weather, and consequently there is only an odd one about. The absence of flies does not, however, permit of any relaxation in the care that must be taken with the fruit, even though there may be many less injured fruit, owing to the absence of fruit-fly puncture, as there is always a percentage of damaged fruit which is liable to speck, which must be picked out from all consignments before they are sent to the Southern States if a satisfactory return is to be expected. If the weather is dry, citrus orchards must be kept in a good state of tilth, otherwise the trees may get a setback. Old worn-out trees can be dug out and burnt; be sure, however, to see that they are worn out, as many an old and apparently useless tree can be brought round and made to bear good crops, provided the trunk and main roots are still sound, even though the top of the tree is more or less dead. The whole of the top of the tree should be cut off and only the trunk and such sound main limbs left as are required to make a new head. The earth should be taken away from around the collar of the tree, and the main roots exposed, any dead roots being cut away and removed. The whole of the tree above ground and the main roots should then be dressed with a strong lime sulphur wash or Bordeaux paste. The main roots should be exposed for some time, not opened up and filled in at once. Young orchards can be set out now, provided the ground is in good order. Don't make the mistake of planting the trees in improperly prepared land—it is far better to wait till the land is ready, and you can rest assured it will pay to do so in the long run.

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward, tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them with fine top soil. If the land is dry the tree should then be given a good watering, and when the water has soaked in the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be overcome by subjecting the fruit to artificial heat, as is done in the case of bananas, during the cooler part of the year, when it will ripen up properly and develop its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

Pineapples, when at all likely to be injured by frost, should be protected by a thin covering of bush hay or similar material. The plantation should be kept well worked and free from weeds, and slow-acting manure, such as bonedust or island phosphates, can be applied now. Lime can also be applied when necessary. The fruit takes longer to mature at this time of the year, consequently it can be allowed to remain on the plant till partly coloured before gathering for the Southern markets, or can be fully coloured for local use.

Banana plantations must be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now means small fruit later on. Bananas should be allowed to become full before the fruit is cut, as they will carry all right at this time of the year; in fact, there is more danger of their being injured by cold when passing through New England by train than there is of their ripening up too quickly.

Bear in mind the advice given with regard to the handling, grading, and packing of the fruit. It will pay you to do so. Land intended for planting with bananas or pineapples during the spring should be got ready now.

Strawberries require constant attention, and, unless there is a regular and abundant rainfall, they should be watered regularly. In fact, in normal seasons an adequate supply of water is essential, as the plants soon suffer from dry weather or strong, cold westerly winds. Where not already done, vineyards should be cleaned up ready for pruning—it is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt area. Don't be frightened to thin out young trees properly, or to cut back hard—many good trees are ruined by insufficient or bad pruning during the first three years. If you do not know how to prune, do not touch your trees, but get practical advice and instructions from one or other of the Departmental officers stationed in the district. In old orchards do not have too much bearing wood; cut out severely, especially in the case of peaches, or you are likely to get a quantity of small unsaleable fruit. There are far too many useless and unprofitable fruit trees in the Granite Belt area, which are nothing more or less than breeding-grounds for pests, such as fruit fly, and are a menace to the district. Now is the time to get rid of them. If such trees are old and worn out, take them out and burn them, but if they are still vigorous, cut all the tops off and work them over with better varieties in the coming season—apples by grafting in spring and peaches and other stone fruits by budding on to young growth in summer. Planting can start now, where the land is ready and the trees are to hand, as early planted trees become well established before spring, and thus get a good start. Be very careful what you plant. Stick to varieties of proved merit, and few at that, and give so-called novelties and inferior sorts a wide berth. Take the advice of old growers, and do not waste time experimenting with sorts that have probably been tested in the district and turned down years ago. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour and badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or island phosphates—can be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when they start growth in spring. Lime can also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees can be pruned now, and vines can be pruned also in any district where there is no danger from late frosts, and where this can be done the prunings should be gathered and burnt, and the vineyard ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the Western districts. The trees should be watered if they show signs of distress, otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should be cut by this time, as, if allowed to remain longer on the tree, they only become overgrown and are more suitable for the manufacture of peel, whereas if cut and cased now they will keep in good order so that they can be used during the hot weather.

THE JOURNAL APPRECIATED.

Thus a Cooroy reader (8th April, 1929):—"I have been subscribing to the Journal for eighteen months, and I assure you I greatly appreciate it."

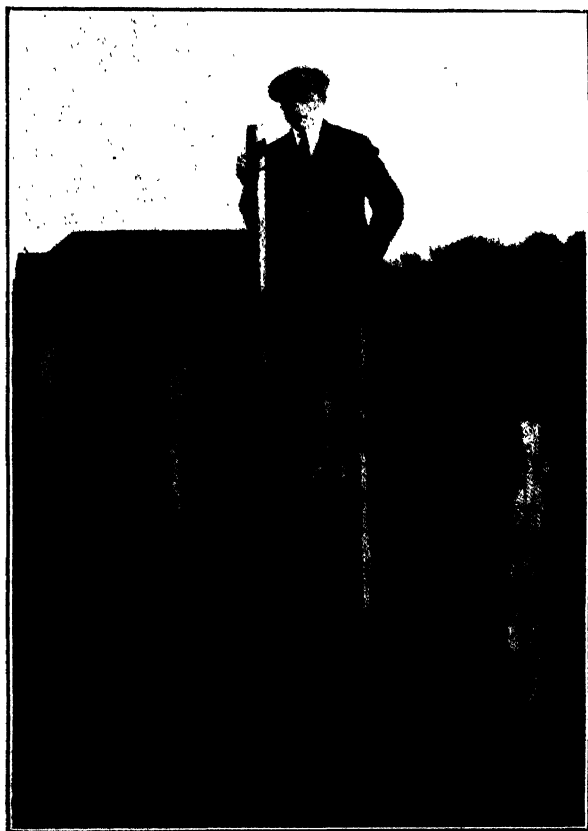


PLATE 105.—DODGING THE BARBED WIRE.
A handy stile for getting over dividing fences.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S., and A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

MOONRISE.

| Date. | May, 1929. | | June, 1929. | | May, 1929. | June, 1929. |
|-------|------------|-------|-------------|-------|------------|-------------|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| 1 | 6.21 | 5.17 | 6.39 | 5.0 | p.m. 10.54 | a.m. ... |
| 2 | 6.21 | 5.16 | 6.39 | 5.0 | 11.51 | 12.25 |
| 3 | 6.22 | 5.15 | 6.40 | 5.0 | | 1.31 |
| 4 | 6.23 | 5.14 | 6.40 | 5.0 | a.m. 12.49 | 2.31 |
| 5 | 6.24 | 5.14 | 6.41 | 5.0 | 1.48 | 3.34 |
| 6 | 6.24 | 5.13 | 6.41 | 5.0 | 2.47 | 4.42 |
| 7 | 6.25 | 5.13 | 6.42 | 5.0 | 3.48 | 5.54 |
| 8 | 6.25 | 5.12 | 6.42 | 5.0 | 4.50 | 7.5 |
| 9 | 6.26 | 5.11 | 6.42 | 5.0 | 5.55 | 8.14 |
| 10 | 6.26 | 5.11 | 6.42 | 5.0 | 7.8 | 9.18 |
| 11 | 6.27 | 5.10 | 6.42 | 5.0 | 8.17 | 10.14 |
| 12 | 6.27 | 5.10 | 6.43 | 5.0 | 9.27 | 11.1 |
| 13 | 6.28 | 5.9 | 6.43 | 5.0 | 10.33 | 11.39 |
| 14 | 6.28 | 5.9 | 6.43 | 5.0 | 11.31 | p.m. 12.13 |
| 15 | 6.29 | 5.8 | 6.43 | 5.0 | p.m. 12.23 | 12.44 |
| 16 | 6.29 | 5.7 | 6.44 | 5.0 | 1.3 | 1.15 |
| 17 | 6.30 | 5.7 | 6.44 | 5.0 | 1.40 | 1.44 |
| 18 | 6.30 | 5.6 | 6.44 | 5.1 | 2.12 | 2.15 |
| 19 | 6.31 | 5.6 | 6.45 | 5.1 | 2.42 | 2.51 |
| 20 | 6.32 | 5.5 | 6.45 | 5.1 | 3.12 | 3.27 |
| 21 | 6.33 | 5.5 | 6.45 | 5.1 | 3.43 | 4.10 |
| 22 | 6.34 | 5.4 | 6.45 | 5.2 | 4.16 | 4.57 |
| 23 | 6.34 | 5.4 | 6.46 | 5.2 | 4.52 | 5.49 |
| 24 | 6.35 | 5.3 | 6.46 | 5.2 | 5.30 | 6.42 |
| 25 | 6.35 | 5.3 | 6.46 | 5.3 | 6.14 | 7.36 |
| 26 | 6.36 | 5.2 | 6.46 | 5.3 | 7.3 | 8.33 |
| 27 | 6.36 | 5.2 | 6.46 | 5.3 | 7.54 | 9.28 |
| 28 | 6.37 | 5.1 | 6.46 | 5.4 | 8.48 | 10.24 |
| 29 | 6.37 | 5.1 | 6.46 | 5.4 | 9.42 | 11.20 a.m. |
| 30 | 6.38 | 5.0 | 6.46 | 5.4 | 10.40 | 12.18 |
| 31 | 6.38 | 5.0 | | | 11.36 | |

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | |
|-------|-----------------|------------|
| 2 May |) Last Quarter | 11 25 a.m. |
| 9 " | ● New Moon | 4 7 p.m. |
| 16 " | (First Quarter | 6 56 a.m. |
| 23 " | ○ Full Moon | 8 49 p.m. |

Perigee, 11th May, at 6.6 a.m.

Apogee, 26th May, at 5-54 p.m.

The Astronomical event of this month will be a total eclipse of the Sun, on the 9th, of unusual duration, lasting for about 5 minutes at Slam and the north end of Sumatra, to which places scientific expeditions will be sent from Europe and Australia; others may go to the Philippine Islands. It will be invisible from the south-eastern part of Australia, but some glimpse of it as a partial eclipse will be observable in northern New South Wales, the whole of Queensland, and North Australia, also in the greater part of South and West Australia. Only a very small part of the Sun will be obscured at Brisbane, about 5 p.m., but the obscuration will be greater in the west of Queensland, where observations should be made half an hour earlier, care being taken to use deeply coloured and smoked glasses.

Jupiter will be on the far side of its orbit beyond the Sun and nearly in a line with it from the earth and therefore invisible on the 14th.

Mercury will be well situated for observation this month, being well above the horizon after sunset, especially on the 15th, being also nearly at its greatest brilliancy.

The beautiful planet Venus, after disappearing entirely from our view by the middle of April, will again grace the eastern sky before sunrise in May, growing more and more brilliant till the 26th, when it will shine almost as brightly as when in the west in March.

At 8 o'clock in the evening on May 1st Mars will be the only planet visible. It will be in Gemini somewhat low down in the north-west above Castor and Pollux and between the latter and Procyon, with the more brilliant star Sirius following Orion. Later in the month Saturn will also be an evening star. The six Zodiacal Constellations arching the sky from east to west early in the month will be: Gemini, Cancer, Leo, Virgo, Libra, and Scorpio. As the last-mentioned rises over the eastern horizon, Orion will be getting near the western. These constellations will be seen to advantage early in May.

| | | |
|--------|-----------------|------------|
| 7 June | ● New Moon | 11 56 p.m. |
| 14 " | (First Quarter | 3 14 p.m. |
| 22 " | ○ Full Moon | 2 15 p.m. |
| 30 " |) Last Quarter | 1 53 p.m. |

Perigee, 8th June, at 1.30 p.m.

Apogee, 22nd June, at 10.54 p.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

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PART 6.

Event and Comment.

The Queensland Sugar Industry.—The Facts Restated.

THE Commonwealth Trade and Customs Department has performed a timely and valuable service to the sugar industry by its recently published examination of the whole sugar position. Its restatement of the facts should be convincing enough for the most economically minded member of the Victorian Housewives' Association, and should remove all doubts as to the wisdom of the present Federal sugar policy. Under that policy only wholesale and manufacturing prices have been fixed, but the wholesale rates are so based as to allow of refined sugar being obtained in every State capital, at a retail price of 4½d. a pound. To wholesale houses the price is £37 6s. 8d., less 2 per cent. discount for cash, and to retailers and housewives the price is the same, without the discount, for more than half-ton lots. Home manufacturers pay £36 11s. 9d. net cash; a special concession is given to fruit processors who pay only £30 6s. 8d. a ton. Under another special provision mill whites are supplied at £33 3s. 9d. a ton cash to retail grocers and housewives for any quantity in excess of half a ton which is the minimum; and £32 10s. 6d. to wholesalers and manufacturers.

The special price to fruit and jam canners has reduced, it is contended, their annual manufacturing costs by over £180,000. Besides stimulating sales, this reduction in factory costs has also been of material assistance to orchardists by increasing the demand for their fresh fruit. Manufacturers, under this arrangement, have also been placed in at least as good a position as regards sugar costs as they would occupy were there no embargo. Then again, an export rebate of ordinary

home consumption prices is given; and these rebates have varied between £80,000 and £109,000 a year, and are fixed by the Export Sugar Committee which is representative of the three interests concerned—the sugar industry which pays the rebates, the manufacturers for export who buy the sugar and receive the rebates, and the Government.

Why the Industry is Protected.

THE chief reasons given for this particular form of protection to the sugar industry are:—(1) World's sugar prices have always been subject to considerable fluctuations, which would cause great difficulty in establishing a fixed rate of duty which would at all times be fair to both producer and consumer. A fixed rate would sometimes give the sugar industry excessive profits at the expense of the consumer, and at other times insufficient profits, or, perhaps, losses, that would seriously injure the industry. Moreover, the constantly fluctuating home consumption price would be more or less embarrassing to manufacturers using sugar in a large way.

(2) After many years' experience, the industry has been found to be the only one capable of establishment on a large scale in the vulnerable coastal districts of the North. Consider, in illustration of this, that from Townsville north there is a population, within a fairly small area along the coast, of approximately 100,000, whereas in the Northern Territory, in approximately the same latitude, the population is only about 3,000. The White Australia policy is intimately bound up with the sugar industry.

(3) If Australia were to import her sugar from abroad, something between £4,000,000 and £5,000,000 a year would be paid to countries where the balance of trade is already substantially against Australia.

(4) The sugar industry pays over £6,000,000 a year in wages, and has created a very large trade with Southern States in manufactured goods of all descriptions.

(5) Sugar production has entirely changed since the kanaka days. A large proportion of the sugar was then produced under the plantation system with numerous large holdings. To-day there are over 8,000 individual farmers engaged in the industry, cultivating an average of 37 acres each and only seven or eight plantations still remain. This has resulted in an intense form of closer settlement which has great advantages both economically and socially.

Since Government control started in 1915 the acreage under production has increased from 173,000 to 284,000, and the number of direct employees from 16,700 to 30,000, while employment is, of course, provided indirectly for many thousands more.

Practical Co-operation.

IT is all very well talking to the farmer, or perhaps talking at him, about the need of adopting modern methods and using up-to-date machinery on his holding if he has not the wherewithal to do it. There are many farmers (good men, too) who, starting without sufficient capital, are struggling on towards that happy day when they can go to the machinery merchant with every confidence to buy and pay for the power to lighten their labour and for which they have longed for years. They realise, none better, the necessity of reducing the costs of production, but the simple fact is they cannot afford the extra and necessary plant. Still, if there is a way out at all they will never be stuck. That is the case with some canegrowers at Bli Bli in the Nambour district. A few of them got together

and formed a syndicate for the purchase of a tractor and a rotary hoe. They went into the matter on a business basis and these modern machines have scarcely been idle a day since their purchase. A charge of 12s. 6d. an acre is made to all users, and where an area cannot be conveniently measured an hourly rental rate is imposed. The machines are available also to non-shareholders who quite fairly are asked to pay a larger fee, £1 per acre being the usual amount, and the machines are used as much by these farmers as by the co-operators. The saving of labour and time means money earned and this fact the farmers are realising in a very convincing way, and the general lament is that this co-operative plan was not put into practice long ago. It has been found, for instance, that on old cane land the rotary hoe can cover 5 acres in the eight-hour working day. It is also used largely in ratooning. By the simple plan of removing the middle bar a row can be straddled and the soil thoroughly stirred alongside the stools on each side. It is now proposed to add a double disc plough to the plant and a saw bench fitment for cutting firewood to the tractor. The present difficulty of the co-operating owners is to satisfy all the demands on their small plant, and this will no doubt lead to its duplication, or even its multiplication, which will be to the benefit of the cane-growers and other farmers in the district. As a case of practical co-operation it is to be commended, especially in districts in which, generally, crops or holdings are too small to justify the individual purchase of expensive machinery. The advantages of power farming on suitable land are so obvious that the small holder will welcome an opportunity to employ it without losing an hour's sleep in wondering how he is going to get over the initial financial hurdle.

Sugar and Pineapples.

ON some of the drained swamp lands round about Bli Bli excellent crops of cane are growing, and this on country that on account of its waterlogged state was formerly regarded as useless except for the game with which it abounded. The crop that it is at present carrying is the best evidence of the soundness of the judgment of those who saw its possibilities once it was drained. Some good crops have been taken off it, and the returns over a series of seasons have quite justified the faith of those who first realised its value and persevered with their plans for bringing it into profitable production. Cane cultivation has been well seconded with pineapple growing, and the local "gardens" have already won a reputation for the flavour and sugar content of their fruit. Large areas are now under crop and some farmers are combining the two crops to their financial advantage, which will continue so long as there is a stabilised market. Paper mulching is used to some extent, and this practice is a great labour-saver as well as a crop insurance. Anybody who has had to live laborious days on a pineapple farm will appreciate anything that will keep the weeds down, and paper mulch does this very effectively. Not only that, but it conserves moisture, and greatly reduces the possibilities of disease. There is another point about paper and that is where fertiliser is used it is reserved for the actual crop and is not exhausted by wet season weeds. For pineapple growing paper mulch is becoming to be regarded as indispensable, and wherever the long parallel strips are seen there you will find orderly fields, quite free from soil-robbing "sports" of every description. At Bli Bli there is a farm on which sugar and pineapple growing are economically combined; and on this holding agricultural standards are high in every department and the condition of the crops and the general layout and obvious intelligent management of the place are all expressive of what is meant by sound field practice the value of which, it is certain, is reflected in crop and market returns.

THE HON. HARRY F. WALKER.

NEW MINISTER FOR AGRICULTURE AND STOCK.

The Hon. Harry F. Walker, Minister for Agriculture and Stock in the new Queensland Government, was born at Gympie on 15th April, 1873. All his early life was lived on the goldfield that has contributed so much to Queensland's progress. He was educated at the One-mile and Monkland State Schools and afterwards at a private Grammar School.

As a young man mining naturally attracted him, and for twelve years he was engaged actively in that industry, both on top and underground. Mr. Walker saw the transition of his native district from one of the most profitable gold-producing provinces to one of the richest and most progressive dairying regions in Australia. In 1910 he acquired a considerable area of land near Gympie and entered into diversified farming in which he has been very successful, particularly in dairying which is his main interest.

Mr. Walker was first elected to Parliament as the representative of Wide Bay in 1907, and has held a seat in the Legislative Assembly ever since. On the redistribution and renaming of electorates some years ago he contested Cooroo, a district on the near North Coast, and had no difficulty in securing the representation of that important rural constituency. His valuable services, Parliamentary and otherwise, to the agricultural and stock raising industries have been recognised by his return without opposition at several successive elections.

Twenty-three years ago, in association with a few other progressive dairy farmers, Mr. Walker assisted very materially in the organisation and establishment of the Wide Bay Co-operative Dairy Company, of which he has been Chairman of Directors for a number of years, besides being a director ever since its inception. This company controls two large modern butter manufacturing plants at Gympie and Cooroy. Its Gympie factory is one of the largest and most complete in the Commonwealth, and in the quality of its output has achieved an enviable reputation on home and oversea markets.

The co-operative movement in Queensland has had in Mr. Walker an ardent, long-sighted and very practical advocate. His interest in dairying particularly led him in 1924 to investigate personally manufacturing methods and marketing systems in Great Britain. This investigation was extended to the Continent and its results have already proved of benefit to the industry in this State, especially on its selling side. While abroad Mr. Walker was also a close observer of agricultural conditions in Europe. He made a special on-the-spot study of Danish dairying organisation and marketing methods, and on his return home contributed a valuable series of Press articles, in which comparisons were often in favour of Queensland, and which added very considerably to our knowledge of present-day dairying practice.

In his day he was a noted athlete and horseman. A supporter of the volunteer movement he joined the Queensland Mounted Infantry which was later to win renown on South African battlefields, and was among the picked body of men chosen to represent Queensland at Queen Victoria's Diamond Jubilee Celebrations in England in 1897. With other Gympie young men who have since loomed large in our public, commercial, and industrial life, including Major-General Senator Sir William Glasgow, the Federal Minister for Defence, Mr. Walker joined the first Queensland contingent accepted for service in the last Boer war. He was with his regiment in every engagement, including Sanna's Post where he won distinction, until he was invalided home.

In his youth the new Minister excelled as an exponent of military sports and figured with success in international tournaments in England at which Queensland Mounted Infantrymen competed, as well as in the Light Horse tournaments at Lytton in the old volunteer days.

Mr. Walker's home is at Tewantin, on the near North Coast, and in the centre of our beautiful lake country. In hours of limited leisure he finds recreation in shooting and fishing in a countryside abounding in native game.



PLATE 106.—HON. H. F. WALKER, MINISTER FOR AGRICULTURE AND STOCK.

VALEDICTORY.

RETIREMENT OF THE HON. W. FORGAN SMITH.

The Hon. W. Forgan Smith, the retiring Minister for Agriculture and Stock, invited the whole of the staff of the Department to meet him in his room on the eve of his relinquishing office for the purpose of bidding them farewell.

Mr. Forgan Smith said that he was very pleased to see so many of his former staff present. He wanted to take that opportunity of thanking them for the very faithful and loyal service they had given him as their Minister. He was about to take his departure from the Department, and he wanted to assure them that he would continue to take a very keen interest in their welfare and their activities in the service of the agricultural industry. He considered that the Department of Agriculture and Stock was the most important in the State, and it was very pleasing indeed to observe that on his recent election tour that there was everywhere appreciation and praise of the Department and its officers. There was a very healthy feeling between the Department and the men on the land, and that co-operation was something that he had always endeavoured to foster. In the development of Queensland agriculture the officers of the Department would continue to play an increasingly important part. The resources and personnel of the Department had been built up with that fact in mind, and its staff, laboratories, and other equipment compared most favourably with those of every other State. Continuing, he added—

“Your sphere of utility to the State is one that is worth while. The provision of a nation's food supply and the elements that go to provide for a people's needs all depend on their agricultural resources and what use is made of them. During my period of office, extending a little over four years, much beneficial legislation has been enacted and certain sound developments have taken place. That, of course, has resulted in certain organisations being built up, which I think will be a permanent feature of the life of the State.

“I just wish to express my very hearty appreciation of the very loyal and efficient service that has at all times been given me as the Ministerial head of the Department, and I feel that loyalty and service will be extended to my successor and to whichever Government is in power. I will continue to take a very keen interest in the work you are doing, and, finally, I would advise the Department in its administration never to allow any other organisation to usurp the functions and activities that could only properly be exercised by the Department. (Applause.)

The Under Secretary, Mr. E. Graham, on behalf of his fellow officers of the Department, thanked Mr. Forgan Smith for asking them to meet him on the eve of his severance with the Department. They appreciated very sincerely the laudable references their former Minister had made to the officers of the Department. They knew that he had set efficiency as his standard, and the splendid example shown by himself as Minister and the keen interest he had taken in the work of his officers he (Mr. Graham) felt sure had had a very striking influence on their work. The fine example of efficiency and co-operation he had set had been reflected throughout the Department. Mr. Forgan Smith's association with them as Ministerial head had extended well over four years; that was a fairly long term for a Minister to remain in one Department, and though it might not be a record as far as time was concerned, he thought that it embraced a record of service to the agricultural industry that would be very difficult to equal. (Applause.)

As a mark of their esteem of Mr. Forgan Smith's sterling qualities, his fellow-officers had requested him to accept a small gift. That gift was also some little tangible evidence of their appreciation of him as a citizen who had taken a prominent place in the affairs of the nation, and also as a man. It was desired also that Mr. Smith should have some little reminder of his association with the Department and its officers. (Applause.)

Mr. Graham then presented to Mr. Forgan Smith a solid silver cigar box, suitably engraved, and a silver cigar cutter and holder.

Mr. Smith feelingly responded. He was leaving the Department, he said, with the heartiest good feeling towards every officer, and his interest in their work would increase rather than lessen with the passing of the years. (Applause.)

Mr. Smith then thanked each officer individually for services rendered to the Department while he was in control.

Bureau of Sugar Experiment Stations.

CANE PESTS AND DISEASES.

Mr. R. W. Mungomery, Assistant Entomologist, stationed at Bundaberg, has submitted the following report (27th May, 1929) to the Bureau of Sugar Experiment Stations:—

RAT DAMAGE IN CANEFIELDS.

Farmers, Beware of Rats.

It is now opportune to issue a note of warning to farmers to keep a keen watch for rats damaging their cane. Cases of destruction of maturing cane by rats have already occurred this season, and more are likely to be met with as the season advances. It is with the object of minimising damage and suppressing these pests that the following notes have been prepared.

Nature of Injury.

Rat attack can easily be recognised by the peculiar nature of the injury, since sticks are damaged by gnawing into the internodes and eating away the softer internal fibres, leaving portion of the hard rind and the nodes intact. Several internodes in succession may be eaten in this manner if the cane be particularly sweet and suitable, whilst at other times, and especially if the cane is immature, only one internode may be eaten into and abandoned. In such cases, these points of attack constitute points of weakness in the individual sticks, and the portions above the damaged part are readily snapped off when the first windy weather is experienced. In other cases, the top portion of the stick may dry out, and the bottom portion may send out a vigorous growth of shoots, thus directing growth into wrong channels. From this it will be apparent that the total loss involved by farmers through rat depredations amounts not solely to the cane actually eaten, but is represented by the total tonnage destroyed, which at times is considerable.

Where to Look for Damage.

Sweeter varieties of cane are more subject to attack than the poorer quality canes, and rats also show a decided preference for the canes with a soft rind; thus it is evident that damage is most likely to occur in sweet varieties possessing a soft rind. Most frequently rat attack commences on farms bordering or adjacent to river banks, creeks, and swamps, &c., where good supplies of grass and debris offer excellent shelter and breeding grounds for them. Uncultivated gullies in farm areas are usually sources from which rat invasion commences, and old standover cane which has become twisted and lies down is particularly attractive to rats, for, in addition to being provided with an adequate supply of food, they are also protected from the attacks of hawks, owls, and other birds of prey.

Control Measures.

To exterminate rats, consideration must first of all be given to the destruction of their shelter and breeding grounds. Grassy paddocks should be fired annually after the nearby cane crops have been harvested. Spaces intervening between blocks of cane should not be allowed to support a rank growth of grasses. Where, because of the uneven contour of the land, it is not possible to cultivate the whole of a farm, any such waste land might well be fenced off to serve as paddocks for stock.

When natural methods of control, such as have been enumerated above, have been carried out and rat damage still occurs, the use of poison baits as a means of lessening their numbers and abating the menace is to be recommended. The most successful and convenient bait to use is the Barium biscuit bait, which has been used with good results in the Mulgrave district in past years, and which likewise has proved effective in the Bundaberg district in the few instances in which it has been used. To obtain the utmost efficiency from such a method, it is essential that concerted action be taken by all growers affected, and if neighbouring growers co-operate when damage commences, much good will accrue, whereas the task is much more difficult for one grower to tackle single-handed. Especially is this so if he is confronted with the task of wiping out rats migrating from neighbouring properties where no system of control is being practised.

To make Barium biscuits, the following ingredients are required in the proportions set out hereunder:—

| | | | | | | |
|------------------|----|----|----|----|----|-----------|
| Barium carbonate | .. | .. | .. | .. | .. | 10½ lb. |
| Flour | .. | .. | .. | .. | .. | 21½ lb. |
| Pollard | .. | .. | .. | .. | .. | 4 lb. |
| Tallow | .. | .. | .. | .. | .. | 6 lb. |
| Salt | .. | .. | .. | .. | .. | 9½ oz. |
| Water | .. | .. | .. | .. | .. | 1 gallon. |
| Aniseed oil | .. | .. | .. | .. | .. | ½ oz. |

Method of Mixing.

Sieve the Barium carbonate and break up all lumps, then mix this poison thoroughly with the pollard and flour in the dry state. Heat the tallow until melted, and then knead it into the flour-pollard-barium mixture. Dissolve the salt in about ¼ gallon of water and add this to the mass, working it thoroughly and adding the remainder of the water in small amounts as considered necessary, until an even dough is obtained which will just stick together. Roll this dough to a thickness of not more than ¼ inch on to trays, cut into pieces ½ by ½ inch and bake in a moderate oven until completely dry. Then mix the aniseed oil with an equal quantity of water and spray over the biscuits when they are cool. A small "Lotol" spray or similar device will serve excellently for this purpose. The bait is then ready for use. It is advisable to handle the biscuits as little as possible, and to rub oil of aniseed on the hands when distributing the bait in the fields.

This mixture is both cheap and effective, and has the further advantage of not being highly poisonous to stock, dogs, or human beings, although only a small portion of a biscuit is required to kill a rat. However, to guard against any cases of poisoning, it is advisable to scatter the baits in places inaccessible to stock, and to store the biscuits out of reach of children.

Barium carbonate may be purchased from Messrs. Taylors and Elliotts, Limited, 154 Charlotte street, Brisbane, and costs approximately 1s. 3d. per lb. The oil of aniseed can be procured from any chemist, whilst the other ingredients may be purchased from the local grocers and butchers.

Distributing the Bait.

In distributing the bait, the usual procedure is to scatter six biscuits every 5 yards along headlands, banks of creeks, &c., where rats are plentiful, and walk through the cane along every twentieth row distributing bait at the rate of six biscuits every 10 yards. This is only a rough guide, as no hard-and-fast rules can be laid down, and distribution of the bait will have to be carried out from a common-sense point of view. Thus, much will be left to the discretion of the person scattering the bait, and he should concentrate on those portions of the field where damage is showing up worst. Used in this manner, Barium biscuits have given excellent results as an effective rat poison, and those farmers who have once tried them are very enthusiastic concerning the benefits to be derived from this system of wholesale poisoning.

Following is a report (15th May, 1929) of the Division of Soils and Agriculture:—

EXPERIMENTAL PLOTS.

The major project of this division for the past quarter has been the initiation of the systematic farm experimental trials. The field officers have suspended temporarily their farm-to-farm inspections, and have spent their time in the selection of farms and farmers suitable for the work. The necessary preliminary arrangements for a number of autumn plantings were also put through, and we have to report that twelve trials have now been set out successfully in the Bundaberg and Mackay areas.

The growers on whose lands these trials are located are—

Southern District.

Gahn Brothers, Tantitha.

Qunaba Plantation, Bundaberg.

L. M. O. Lucas, Skyring's Reserve.

P. Petersen, Bingera.

A. Adie, Childers.

Burrage Brothers, Maroondan.

Mackay District.

J. Trevaskis, Farleigh.
H. Single, Foulden.
E. Evans, Richmond.

J. Gibson, Racecourse.
Alexandra Plantation, Palms.
Laws and Baker, North Eton.

Variety trials have also been set out on Windermere and Fairymead Plantations to test the value of certain promising Indian varieties, which were introduced during the past few years, against the standard canes of the area.

Growers are urged to follow the progress of those plots which have been set out on lands on which the soil type is similar to that on their own farms; for it is hoped the results obtained will be generally applicable on all lands of a similar type in the particular area.

The arrangements for the proposed trials in the Northern area are also well in hand, and, given favourable planting conditions, the laying-out of the plots will be pushed ahead.

The names of the farms on which trials have been set out will be published from time to time.

Supply of Fertilisers.

We are pleased to announce that the fertiliser distributing firms have displayed considerable interest in the farm trial project. In their desire to be of practical assistance in the work, they have placed at our disposal a quantity of fertiliser sufficient for the requirements of the sixty trials which we plan to set out this year. The fertiliser will then be passed on to the growers on whose land trials are located, in return for any added labour which the experimental trial may impose upon them.

Suggestions for Mackay Growers.

In the course of our field work in the Mackay district we have attempted to determine some of the problems which stand in the way of crop improvement; and we have prepared the following notes bearing on these questions, together with our proposals for a solution of these difficulties.

A study of the cane soils in the valley of the Pioneer River shows that they are, in general, of an alluvial nature. Along the river banks the deposits are of recent origin, and are consequently deep sandy loam soils. Now this "sand" is not altogether quartz sand, and under weathering conditions it decomposes to give a sandy clay—the "red clay" that is often spoken of in describing the older subsoils, which are developed at some distance from the river. The soils on the majority of the plain are from 8 to 16 inches in depth, and this variation in depth of surface soil is the feature which requires study in the intelligent cultivation of the soil.

In general, an "ironstone" layer is met with between the soil and the subsoil proper. This is only 1 or 2 inches thick, but is a most important factor in the welfare of the crop. This layer is generally "tight" and impervious to water. Our borings by means of a soil auger have shown that the subsoil beneath this pan may be quite dry, even after continuous rains, while the surface soil cannot be worked due to excessive water which cannot drain off.

Now it is well recognised that crop roots require a well-drained aerated soil if they are to function successfully. Hence the net effect of such a hard pan at a depth of but a few inches below the surface is to give a shallow soil which, without adequate surface drainage, readily becomes water-logged, and under dry conditions the plant is not able to draw on a supply of moisture which might be yielded by the subsoil.

The remedy is, then, to attempt to break up this hard-pan layer, and thus increase the depth of available soil. Where the soil is but 8 inches deep it is recommended that at each breaking of the land a little of the subsoil (say 1 inch) be brought up by the plough, and worked into the surface soil. In this way the layer will be destroyed, and the depth of soil gradually increased.

Where the hard pan occurs at a depth of 10 to 12 inches this method may not be practicable. In this case the use of the skeleton plough or subsoiler may be employed, and thus break up the layer to promote better drainage conditions and provide a ready passage for the roots into the subsoil.

Surface Drainage.

On many lands a system of adequate surface drainage is very desirable to hasten the removal of the surplus water which the land receives during the wet season, and thus aid in the restoration of soil conditions more suitable for the growing crop.

When making field waterways with the scoop the transported soil should be distributed evenly and back from the headlands, otherwise the field becomes basin shaped. Planting in beds would also aid materially under conditions of difficult drainage.

It is significant that many growers could advantageously cultivate smaller areas with more profitable results. Better and more timely cultivation would then be possible, and the crop would respond better to the cultural treatment, besides giving the full benefits to be derived from the use of fertiliser. Earthing-up to plant and ratoon cane is a practice too frequently abused.

Varieties.

Too many varieties are grown. A selection of four varieties should meet the requirements of 90 per cent. of the lands in this area, and all others should be discarded. We are aiming at assisting growers in this respect by laying out well-planned varietal trials under varying soil conditions.

Fertiliser Applications.

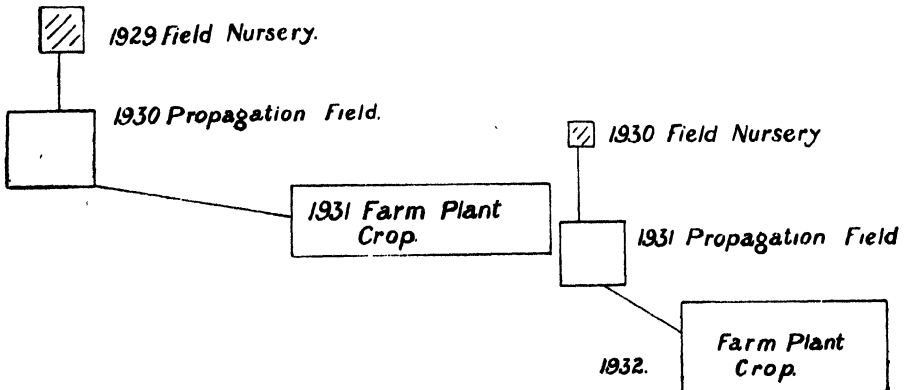
Every attempt should be made to stimulate vigorous crop growth early in its life. Early applications of fertiliser are a very valuable aid in this respect. It is recommended that at least a portion of the fertiliser be applied in the drill at planting, and the balance in a furrow made near the cane row, as soon as the crop is established. Sulphate of ammonia or nitrate of soda should be applied as a top dressing always.

With ratoons, all mixed fertiliser should be applied in the drill when cutting away from the stools; if practicable this should be done within two or three weeks of harvesting. Extra nitrogen applications in the form of sulphate of ammonia should be made as a top dressing six or eight weeks later.

Use of the Best Cane for Seed.

Only the best material should be used for planting. This has proven the soundest policy both in this country and elsewhere. A good plan has been devised on certain Hawaiian plantations, which might be adopted here. It aims at securing only sound and healthy material for plants. Selected seed is planted in a section called the field nursery. The cane cut from this plot is transferred the following year, after reselection, to the propagation or field seed plot. This field is ready in the following year to supply sound and healthy canes for farm planting purposes.

The process is repeated each year. The plan may be represented diagrammatically as follows:—



The area of land needed for this purpose would be quite small—the propagation field need not, in general, exceed 2 acres in extent—and growers could assure themselves of a ready supply of most suitable planting material.

FUTURE WORK OF THE DIVISION OF AGRICULTURE AND SOILS.

With the return of the three travelling research fellows from overseas recently, the Bureau has been reorganised in order to promote more efficient working amongst its different branches. Four divisions have now been created, each with an officer in charge, as follows:—

Division of Agriculture and Soils—Dr. H. W. Kerr, Chemist and Agriculturist.

Division of Pathology—Mr. A. F. Bell, Pathologist.

Division of Entomology—Mr. E. Jarvis, Entomologist.

Division of Sugar Technology—Mr. N. Bennett, Sugar Technologist.

The officer in charge of each division will work out his plan of campaign, in consultation with the Director, and direct the activities of the officers attached to his branch.

The future policy of the Division of Agriculture and Soils has been finalised recently, and it is felt that growers will be interested to learn of the nature of the investigations which are being carried out.

The ultimate aim and object of the Bureau must be to assist growers in reducing costs of production. Our Pathologists are endeavouring to instruct farmers in the identification of diseases, and in the control measures which they should adopt to obviate losses due to this cause. They are also attempting to secure new varieties, resistant to disease, and at present quite a number of foreign-bred seedlings are being grown, preparatory to disease-resistance trials. Under their supervision seedlings will also be raised in Queensland, with a view to securing superior disease-resistant varieties.

The Entomologists are studying the life histories and habits of insects of economic importance to the cane industry, and they, in turn, are seeking control measures to enable the checking of this form of wastage.

To the Agriculturists falls the task of demonstrating the best cultural methods to employ, of determining the fertiliser needs of our various soil types, and of the adequate testing of cane varieties to find out which are best suited to our various districts. In addition, the Experiment Stations will continue their field trial work and the propagation of varieties while this year the practice of seedling raising will be extended to the Mackay and Bundaberg Stations.

All seedlings are raised at present at South Johnstone, where conditions are so admirably suited to the securing of crosses between different varieties to produce new seedling canes. Conditions on our other two stations are not so satisfactory in this respect, so that it will be necessary to transfer arrows which have been produced at South Johnstone to each of the more southern stations. Here they will be planted out, and the resulting seedlings tested for their suitability under the particular conditions of those districts.

The major portion of the work of the Agricultural Division for some years to come must be, however, the laying down of suitable farm trials, in order to determine the fertiliser requirements of our important soil types. In the past, fertility trials have been confined to the Experiment Stations; but it is appreciated that the results obtained on these lands are quite limited in their application, and it is more desirable to secure our knowledge for the several soil types in any district by well conducted field trials on the lands of chosen farmers in that area.

Our experiences have taught us that much can be attained on our sugar lands by the use of the correct fertilisers applied at the right time and in appropriate amounts. This is the reason for our attaching so much importance to this phase of the work. It will be appreciated that, to carry on the work successfully, much careful supervision will be involved in the planning, laying out, making growth observations, and harvesting of these farm trial plots. For the coming planting season about fifty or sixty of these trials will be set out on selected areas throughout the Queensland sugar districts. It is our plan to extend this work from year to year, and as each trial must be carried through at least to the second ratoon crop there will be about 200 such trials under way within three or four years.

Our method is to inspect each district and select lands which are about to be planted, which carry soils representative of important types found in the area. A trial is then planned which should yield the maximum amount of useful information regarding the response to the important fertilising constituents either singly or combined. Results from such trials will afford us definite knowledge regarding the need for nitrogen, phosphoric acid, potash, &c., on that soil type. It will then be possible to give a trustworthy recommendation as to the proportions of the various constituents in a mixture best suited to the particular soil.

In selecting farmers for our purpose we have deliberately chosen, as far as possible, those men who are keen and appreciative of the value of this type of work, and who command, moreover, the confidence of their neighbours whose lands possess

soil of a similar type. It is thus hoped that the latter will be interested in watching the development of the trials and be convinced of the value of the results so obtained. The chosen grower is asked to supply the fertiliser required for the trial, but the added work of plot layout, supervision of harvesting, &c., will be taken in hand by our officers. The produce of each plot will be carefully weighed and analysed so that the true value of the treatments may be accurately determined. The co-operation of the various mills has been assured us with regard to the latter phase of the work.

As we are able to handle this year, on an average, only two trials in each mill district, it is appreciated that many growers who would willingly co-operate with us in this respect must be disappointed for the time being. But as the scope of the work will be extended from year to year, it is hoped that they will have an opportunity, at a later date, of having trials set out on their farms.

For the present the trials will be confined to a determination of the fertiliser requirements of the soil and crop. However, the scheme will be extended so as to embrace all phases of experimental work, which will help growers in their pursuit after increased efficiency in sugar-cane cultivation.

It must be pointed out that the Bureau can help only those growers who will try to help themselves. Only by the closest co-operation between growers and the officers of the Bureau can we hope to attain the desired end; and growers have our assurance that we are ready to carry out, in full, our share of the contract.

Mr. A. N. Burns, Assistant Entomologist, stationed at Mackay, has submitted the following report for the month ended 12th May, 1929:—

MACKAY DISTRICT.

Greyback Grub Injury.

Injury to cane by grubs of this pest is now showing up in many portions of the whole district, and many growers who have never before been troubled with grubs, have reported damage this season. Some farmers with many years' experience in the district state that they have never before seen such extensive grub injury.

Inspections made in affected areas during the past month indicate that from the average condition of the grubs, they will continue to be active at least until the beginning of June, before they commence to burrow down to form their pupal cells. When a grub is "fully fed" it assumes a creamy-yellow colour and loses its glossy appearance; but when active and feeding, the skin is clear and transparent, and the soil that has been ingested clearly shows black through the skin at the anal end of the body. All grubs examined so far have not shown indications of being fully fed, therefore injury is likely to be done to cane for a further period of at least three or four weeks. The creamy-yellow appearance of grubs that have finished feeding is due to fat substances being stored up in the cell tissues directly beneath the skin.

Distribution of Injury (Summarised).

In the Sarina area, damage is fairly extensive at West Plane Creek, and a number of farms are affected to a more or less serious degree. During the past, growers in that area have been judiciously cutting out feeding trees and collecting beetles, and, although during the last fighting season no large flight of beetles was noted there, the grub damage at the present time is greater than usual. Several farmers in the vicinity of Plane Creek mill are also affected, one or two farms being seriously attacked.

Around Racecourse the damage appears to be more sporadic, and smaller patches are subjected to injury. The worst damage that has come under the writer's notice, and that is close to the mill, is in the Foulden area, where one or two farms along the Pioneer River are fairly badly attacked.

In the Farleigh area, infestation (with the exception of Habana) is also sporadic, and damage is confined chiefly to the elevated lands and hill slopes. Some fairly large "grub patches" are to be seen on several farms. In the other parts of this mill area, Habana is by far the most seriously affected, and of four farms that suffered grub damage and that were inspected in one day, the estimated losses of the total crop in each case was, in descending order of importance, 40 per cent., 17 per cent., 9 per cent., and 7 per cent. The serious loss of 40 per cent. on the first farm may be considered as a very fair estimate, because practically all the cane was growing on hill slopes where the grub patches stood out plainly, covering almost half of the total area under cane. Close examination revealed the fact that a great deal of the cane had already fallen down, and that much more would soon follow.

In general, most of the damage was confined to hillsides and high banks of water-courses.

In the Owen's Creek district, infestation appears to be general and bad throughout. Practically every farm in the area embraced between the end of Owen's Creek railway branch and a distance of some three miles from Garget, shows grub injury more or less badly. On two farms in particular, it reaches serious proportions, one estimate being calculated at being between 35 per cent. and 40 per cent. of the total crop. Much of the cane was down and therefore too far gone for fumigation, and as the cane could not yet be harvested, there would be little chance of saving the stools for ratoons. Beyond Garget and as far as Hatton, grub damage is showing up in patches on many farms. It is, however, chiefly confined to higher ground, but was also noted in one or two instances on perfectly level ground.

Some very bad injury was observed in the Mia Mia district, where several large canefields were almost wholly attacked, and much good cane had fallen over. The losses in this area were individually greater than any others noted in the district.

Around both Marian and Pleystowe mills, quite a number of farms show indications that grubs are at work. Farther out in the Mount Jukes and The Leap areas, which are usually subjected to the ravages of grubs, have not escaped any the less this season. Several growers in these two localities have been fumigating earlier in the season with carbon bisulphide, and have reported very good results therefrom. It is indeed encouraging to receive such reports, for it shows that results have actually obtained in the field, other than in the nature of "experiments."

Fumigation against Grubs.

As already just mentioned several growers in the two abovenamed districts have been fumigating their cane with carbon bisulphide, and have reported a very good "percentage of killed grubs," and also that the cane treated had recovered from its setback. It is of interest to note from one particular grower's experiences, that he received better results from central stool fumigation than from the usual method of applying the doses of poison to both sides of the stool. The method he employed was to place the injector to the required depth as near as conveniently possible to the centre of the stool, and give one dose directed towards the *opposite* side of the stool, then simply turn the injector round so that the aperture faced the reverse way, and give another dose, facing the operator. Very large stools would receive three doses given equidistantly in the stool.

From this method it was claimed that the grubs being mostly centred directly under, and in the stool, the fumigant was brought more in direct contact with them, and did not have to pass through so much soil, &c., before reaching them. A considerable saving of time was also reported on account of the elimination of going along both sides of the cane rows; by this method both sides being reached whilst going one way along the rows.

Miscellaneous.

The present degree of grub infestation taken over the district as a whole is considerably greater than that which is usually experienced. That this is clearly so may be inferred from the many reports coming to hand from growers who have previously never been troubled with grubs. It does not necessarily follow that the damage next season will be as great, or greater than that occurring at the present time. Many natural factors such as dry weather, &c., may exert considerable check over next season's emergence of beetles. Prolonged dry weather by hardening the ground, frequently causes many beetles to perish within their pupal cells, the hardness of the ground preventing their free emergence. On the other hand if conditions are favourable and all the beetles emerge, natural insect parasites may check many. It is very often observed that after an apparent scarcity of a particular insect, there follows an unusually large number the next season, and that again this abundance is in turn followed by a scarcity. This is generally attributed to the fact that when the insect in question is scarce, its parasites are also scarce, and when plentiful the parasites have an opportunity of breeding up, which, assisted by numerous other factors, helps to restore natural balance.

In view of the present situation regarding grubs in canefields, it would be advisable to growers who purpose fumigating next season, to note the particular areas subjected to attack at the present time, then to be ready to fumigate early next season—i.e., in January and February. It may be well to mention again that both injectors and fumigant (carbon bisulphide) may be obtained through application to the Secretary of the Mackay District Pests Destruction Board; the latter being supplied to farmers at a very much reduced rate of cost.

ABSTRACTS AND REVIEWS.

"FRUIT WORLD ANNUAL."

A Comprehensive Review of the Australian and New Zealand Fruit Industry.

The 1929 "Fruit World Annual," a copy of which is just to hand from the publishers, gives a very comprehensive review of the fruit industry in Australia and New Zealand.

In Australia there are 388,000 acres under fruit, yielding an annual value of over £11,000,000. Details and statistics are given in the "Annual" of the area under the various kinds of fruit in the several States, the quantity harvested and the value. Descriptions are also given of the principal fruitgrowing activities in each of the States and in New Zealand.

The various sections of the fruit industry are separately dealt with—dried fruits, jam and canning, the citrus industry, deciduous fruits, cold storage, &c.

On the subject of marketing, full details are given of the facilities in every State, while as regards export the situation is capably reviewed, particulars being given regarding London, Liverpool, Hull, Manchester, Newcastle, Glasgow, and other ports in England and Scotland, together with details of the principal Continental ports so far developed for receiving Australasian fruit.

The need for sending high quality fruit is emphasised, and to be of practical service, twelve pages are devoted to the subject of packing fruit, with numerous illustrations.

One of the most interesting features from the growers' point of view is the series of illustrations in natural colours of principal fruit pests and diseases, complete with effective remedies for the same. Other practical subjects for growers include the planting of fruit trees, manuring the soil fertility, monthly seasonable orchard work and spraying.

A list is given of the Fruitgrowers' Associations throughout Australia, also a list of the fruit cool stores and the capacities thereof. To help growers to be methodical a bookkeeping system is included, together with details for making income tax returns.

For those interested in statistics of area and production, quantities exported, &c., the "Fruit World Annual" will be found very useful. For the grower the various cultural articles and illustrations are of practical value. Our copy is from the publishers, The Fruit World Proprietary, Limited, Melbourne.

NOMINAL ROLL FOR PLATE 107.

Back Row.—A. J. Crees (Engineer, Mossman); F. Keogh (Experiment Station); J. D. Clarke (Engineer, Pleystowe); R. R. Campbell (Manager, Racecourse); — Chappel (Engineer, Babinda); W. F. Clarke (Mill Overseer, Pleystowe); W. Harrison (Chemist, Plane Creek); J. Pollard (Chemist, Racecourse).

Second Row.—T. Harrison (Chemist, Proserpine); J. W. Inverarity (Managing Director, Pleystowe); H. E. Turner (Chemist, Tully); E. J. Doig (Walker's Limited); H. Horton (Engineering Supply Company of Australia); J. Mackenzie (Chemist, Marian); J. W. McGibbon (Chemist, Cane Prices Board); F. W. Cameron (Cameron's Limited, Mackay).

Third Row.—B. E. J. Martin (Manager, Pioneer); C. Smith (Manager, Cattle Creek); M. B. Davis (Chemist, Kalamia); M. R. Gibson (Manager, Proserpine); M. A. Doolan (Chemist, Mulgrave); Colonel D. E. Evans, D.S.O. (Managing Director, Evans, Deakin, and Company, Limited); Max. Smith (Engineer, Mulgrave); H. G. Goldsmith (General Manager, Walker's Limited); F. W. Heck (Chemist, Rocky Point); R. Clarke (Manager, Pleystowe); R. E. Leck (Chemist, Cattle Creek).

Front Row.—C. J. Thatcher (Chemist, Pleystowe); Val Thorpe (Manager, Plane Creek); C. H. O'Brien (Chemist, Mossman); J. O'Neill (Manager, Marian); W. F. Seymour Howe (General Manager, Mulgrave); Miss Wyllie (Typiste); A. J. Barbat (Barbat and Sons, Mackay); N. Bennett (Technologist, Experiment Station); W. Adams (Managing Director, Bundaberg Foundry); W. Thorpe (Engineer, Plane Creek); H. Martin (Chemist, North Eton); W. Pollock (Engineer, Tully); G. H. Thirkell (Engineer, Racecourse).

Absent.—S. H. Scougall (Manager, North Eton); W. Mackinnon (Manager, Farleigh); J. Evans (Engineer, Farleigh); W. Emerick (Chemist, Kalamia).

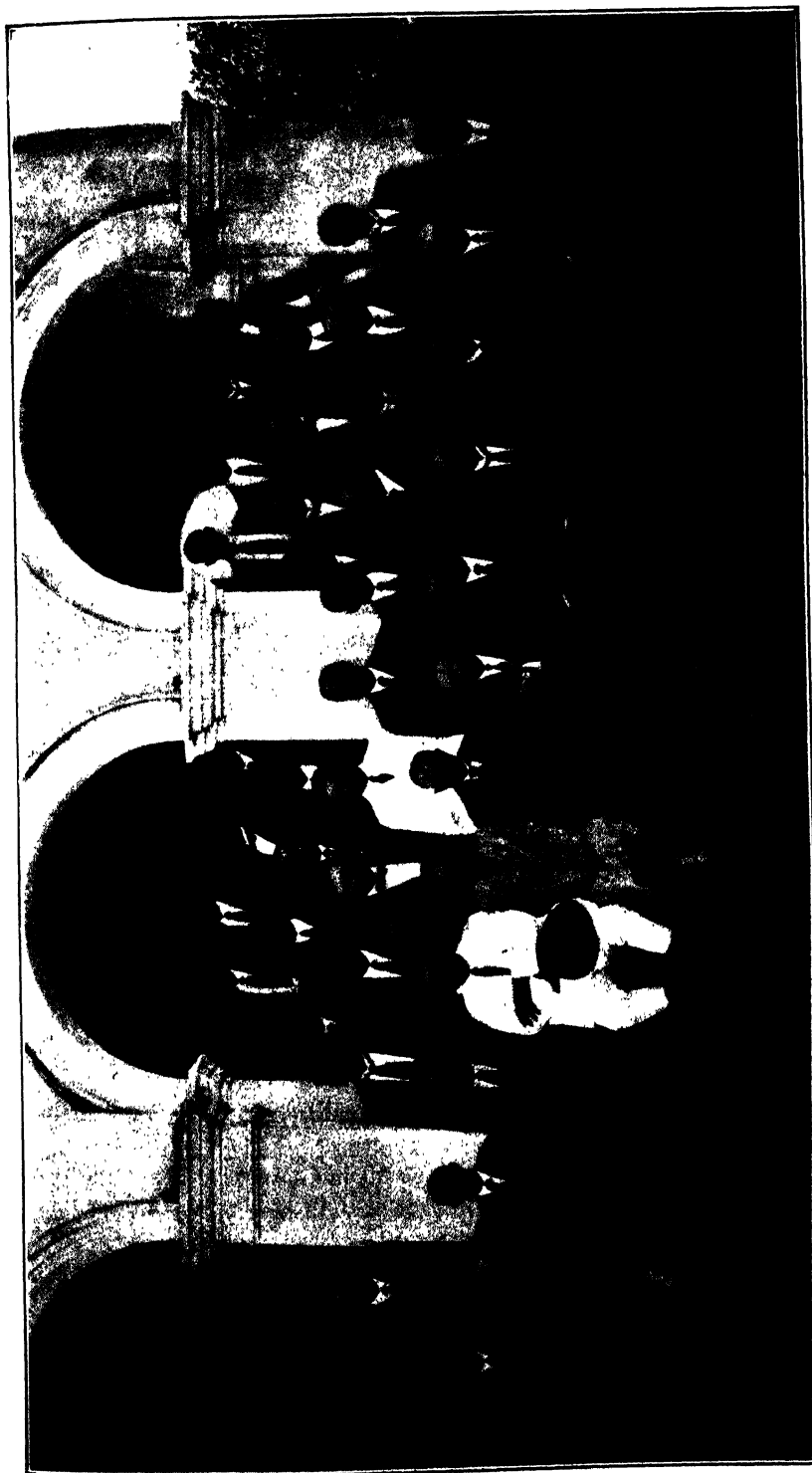


PLATE 107.—QUEENSLAND SOCIETY OF SUGAR CANE TECHNOLOGISTS.—FOUNDATION MEETING AT MACKAY, MARCH, 1920.
(See page 404).

FUNGICIDES AND DISEASE CONTROL.*

By J. H. SIMMONDS, M.Sc., Plant Pathologist.

Three main lines of attack are available to the agriculturist for the control of plant disease. These are: The use of resistant varieties; the employment of special cultural methods; and the application of fungicides.

RESISTANT VARIETIES.

It has been found that in various crops there may arise from time to time a certain variety or individual which exhibits a marked resistance to a particular disease to which others of the same species are specially subject. This resistance is sometimes the result of an alteration in the anatomical structure of the variety in question which makes it more difficult for infection to take place. For example there may be a thicker outer wall developed by the epidermal cells of the resistant plant. More often, however, resistance is due to physiological factors whose exact nature is usually difficult to ascertain. Some differences in the composition of the cell sap, although so slight as to be undeterminable, may be sufficient to inhibit the growth of the parasite. Resistant varieties can often be improved by breeding and selection, and when suitable commercially their use constitutes the ideal method for overcoming loss from disease. As the resistance is an inherent character of the plant itself, other troublesome control measures can be dispensed with. The growing of wilt-resistant varieties of tomatoes is a case in which a serious fungus disease has to a large extent been overcome by this method. Some varieties avoid disease owing to the fact that they are early or late maturing, and their susceptible period of growth is passed through during that part of the season in which the parasite is inactive. Some useful wheat varieties owe their freedom from rust to this habit.

It should be remembered that, owing to variations in local growing conditions and also probably to the presence of more than one strain of the parasite, a variety may show resistance only in one particular region. Each district has therefore to try out varieties for itself. Also the resistant qualities have to be maintained by careful selection, or otherwise they may be gradually lost. Not only disease resistance, but general vigour and productiveness, can be greatly increased or diminished according to the amount of attention or lack of attention devoted to selection for propagation purposes.

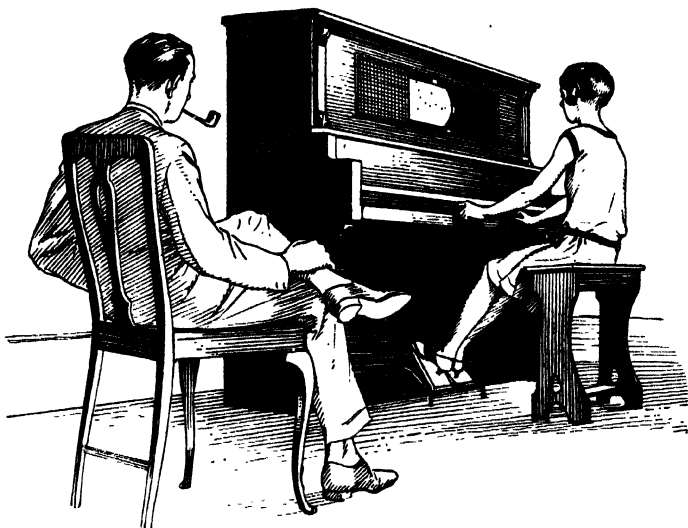
CULTURAL METHODS.

Control measures involving special cultural practice have two main objects in view—(1) To increase the crop's endurance by supplying it with its optimum conditions for growth; (2) to reduce to a minimum the amount of infectious material present by means of general sanitation and crop rotation.

Improvement of Growing Conditions.

It is a fact observed by most growers that it is usually the plant showing poor growth which is damaged most by disease. The strong vigorous individual, although attacked, is not the same commercial

* Reprinted from "Pests and Diseases of Queensland Fruits and Vegetables," by Robert Veitch, B.Sc., F.E.S., and J. H. Simmonds, M.Sc., published by the Department of Agriculture and Stock, Brisbane.



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failure, as it is in a better condition to outgrow the effects of the parasite. Moreover, there are some weak parasites which can attack their host only when this is in an unhealthy condition. In attempting to produce a vigorous plant, a rank succulent growth, such as sometimes follows excessive use of nitrogenous manure, should be avoided, since the soft tissues of these plants are often responsible for a more extensive invasion by actively spreading parasites such as the fungus responsible for Irish blight.

The first objective in the control of disease should therefore be an attempt to obtain for the crop its optimum conditions of growth. For this purpose, careful consideration must be given to the drainage and judicious manuring of the land, if this is not altogether suitable for the purpose for which it is required. Good cultivation and if possible irrigation should be practised in order to maintain continuous growth.

The result of inattention to the maintenance of soil fertility can be seen at the present time in the unhealthy condition of many of Queensland's older citrus and other orchards which have been continuously cropped for many years without any attempt at replenishing the soil.

Bad drainage is probably one of the most common sources of trouble, and moreover this condition is not always apparent from a superficial examination of the land, as hardpan or an impervious bar may occur in isolated areas on otherwise well-drained land. Even if not completely killed by asphyxiation, roots subjected to waterlogging may be weakened to such an extent that they become invaded by various fungal and bacterial organisms of the soil which set up a root rot. On the aerial parts various forms of dieback may result from invasion of organisms only able to attack the plant in its weakened condition. Though the primary cause of injury may have been due to excessive accumulation of water, the effect on the plant often does not become evident until some time after this occurred, when the drying out of the soil leaves the plant to feel the effects of a diminished root system.

As several of the fungi attacking the root, crown, and branches of fruit-trees require a wound to enable them to penetrate through the highly resistant bark, care should be taken that injuries are not given during cultivation and pruning. If large branches have to be removed the cut should be made clean and the surface covered with Bordeaux paste.

Sanitation.

In some cases the grower himself is largely responsible for breeding up a disease on his own farm. Much can be done to keep disease in check by merely following out simple precautions for general cleanliness. As refuse from a diseased crop may be bearing the fruiting bodies and spores of the organisms causing disease, all infected material should be carefully burnt as soon as the crop has ceased to be productive. If the disease is observed to be starting in a small area, its spread may sometimes be checked by immediate destruction of the affected plants. Care should be taken that disease is not carried from infected to healthy areas by means of contaminated clothes, boots, pruning tools, &c.

Rotation of crops will allow parasitic organisms to die out of infected fields, and should be practised whenever possible. Rotation is especially necessary in the case of such fungi as species of *Fusarium* and *Rhizoctonia*, which are often able to maintain a saprophytic existence on dead organic matter in the soil and will from this pass to a suitable living

host should one become available. Such fungi can often retain their soil existence for considerable periods, and if possible allowance should be made for at least a three-year interval between plantings of a crop susceptible to a disease with which the field has become infected.

A seed-bed should always be located on land near which the particular crop or a closely related one has not been grown previously, and if virgin soil can be used so much the better. If a suitable site is not available and the crop is one subject to soil-borne diseases, sterilisation of the bed may be resorted to.

Disease may be introduced into a clean area on infected seed or by using cuttings, &c., from diseased plants. Examples of this are seen in the introduction of potato scab by the use of infected sets, and in the spread of Panama disease of bananas by planting suckers from diseased stools. If possible, seed, cuttings, tubers, &c., should be obtained from a district in which disease is not known to be present. If contamination is suspected, various methods of sterilisation may be practised. This is advisable as a routine procedure with those crops subject to seed-borne disease.

DIRECT CONTROL BY THE APPLICATION OF FUNGICIDES.

As was pointed out in Chapter 4, the development by fungi of an ectoparasitic and endoparasitic habit of growth opens up two methods for their destruction. Ectoparasitic fungi, living as they do on the surface of their host, can be killed by direct contact with a suitable fungicide. For this purpose, sulphur applied in the form of a dust or as sulphur compounds in solution has proved most useful. Under warm conditions the sulphur reacts with the oxygen and water vapour of the air to produce a volatile compound to the action of whose fumes the mycelium of the fungus quickly succumbs. The class of diseases known as the powdery mildews are treated by this method. The endoparasitic parasites once within the tissues of their host are safely sheltered from the effect of fungicidal applications. To control such invaders it is necessary to get in early and prevent infection from taking place. For this purpose all the susceptible parts of the plant must be covered with a thin film of poison which, while it is not injurious to the plant itself, will affect the fungus to an extent that will prevent the germ-tube put forth by the developing spore from penetrating the surface. Owing to their protective outer covering, it is not usually possible to kill the spores themselves before germination without using a spray too strong for the plant to stand. Various copper compounds have been found to give the best results in resisting the attack of endophytic fungi. The most commonly used of these fungicides are Bordeaux and Burgundy mixtures. When properly prepared these will not injure the plant, nor are they sufficiently poisonous to be harmful should sprayed fruit be consumed with the chemical still present.

The copper fungicides are usually applied in the form of a wet spray. Of recent years there has been a tendency in some countries to apply the poison in the form of a dry powder as a dust. Reports of the results obtained from dusting as compared with the wet spray are rather conflicting, but dusting on the whole would appear to be a less effective method, especially during a season of heavy rainfall.

The advantages of the dust over the wet spray are—

- (1) The ease and rapidity with which a dust may be prepared and applied reduces labour costs.

- (2) The apparatus used is less costly and lighter to work with.
- (3) No water is needed, which is a consideration in some localities.

The chief disadvantages are—

- (1) The results obtained from dusting are often not equal to those obtained from the application of a wet spray.
- (2) In order to obtain proper covering it is necessary to dust when the air is comparatively still. If the surface of the plant to be treated is at all shiny, moisture must be present to ensure adherence.
- (3) The adherence of a dust is not usually as great as that of a spray, which necessitates more frequent applications.

Reliable copper dusts applied under suitable conditions should give a control sufficient, when the other advantages are taken into consideration, to justify their use. Unfortunately these necessary conditions are not to be had to order, and in the present state of knowledge regarding dusting this procedure cannot be recommended as a universal substitute for the wet spray. It should be noted that the above remarks do not apply to dusting with sulphur, which has been proved to be very effective for the purposes for which it is employed. The difference is that sulphur acts by reason of the fumes which it gives off, and complete covering and long adherence are not of such paramount importance.

To obtain best results from a minimum expenditure of the material, the spraying machines should be capable of delivering the fluid at high pressure through a suitable nozzle so that a fine mist-like spray is produced. This will give a more even and thorough coating than the coarser spray of the low-pressure pump. Spraying on showery or wet days should be avoided as far as possible, as several hours is necessary for a spray to dry thoroughly and retain its lasting properties.

Care should be taken that the crop is well covered with spray during moist or muggy weather, as atmospheric conditions of this nature are very suitable for spore germination and are thus conducive to the spread of most fungus diseases. Hot dry days usually serve as a check to disease, and the delicate spores of many fungi become quickly desiccated during such times.

The number of different specifics which have from time to time been advocated for the control of various diseases is considerable. There are, however, a few which have a more or less general application and which have stood the test of long usage. The more important of these will be shortly described below.

Bordeaux Mixture.

This spray is probably the most widely used fungicide at the present day. It consists of a somewhat indefinite mixture of copper compounds, including basic sulphates, in which the copper has been precipitated until practically none remains in solution. The spray is therefore non-injurious to the plant, since the injurious copper salts cannot be absorbed into the tissue of the living organism unless in the soluble form. Minute quantities are, however, dissolved by the acids of the plant juices, and these are sufficient to prevent fungus infection. The poison in these minute doses also acts as a stimulant to the plant itself, and thereby promoting a more vigorous growth aids it in resisting the invasion of the attacking parasites.

Formula.

| | |
|-------------------------------------|-----------|
| Bluestone (copper sulphate) | 6 lb. |
| Burnt or quick lime | 4 lb. |
| Water | 40 galls. |

This is briefly referred to as a 6-4-40 formula.

Dissolve the bluestone in half the required amount of water in a wooden or copper vessel. If crystals are used, this is best done by tying them in a piece of sacking which is left suspended in the top of the water overnight. Powdered bluestone can now be obtained, which dissolves very readily. Only wooden or copper vessels can be used to contain the bluestone solution, as this chemical will quickly eat through iron. Wooden casks form convenient receptacles.

Slake the lime in another vessel by the gradual addition of small quantities of water, when the heat generated will aid the reaction. After slaking is complete, water is added to make up the remaining half of the total required. Only best freshly burnt lime should be used, as otherwise there is likely to be an excessive amount of useless residue, and the final composition of the spray will be affected. If burnt lime is not available, good-quality hydrated (not air-slaked) lime can be used, but half as much again is required. It is usually difficult to prevent burnt lime from becoming air-slaked in moist climates, but this difficulty may be overcome by slaking the lime before it deteriorates, and keeping under water. For convenience in using later, store a known amount in a known volume of water.

The two solutions, bluestone and lime, are poured simultaneously through a fine strainer into a third container, or the spraying vessel and the mixture stirred well for a few minutes. This method gives a fine gelatinous precipitate which does not readily settle out. If necessary, one solution can be poured directly into the other, provided the latter is kept well stirred during the process. Concentrated solutions should not be mixed before dilution, as the resultant precipitate tends to be of a granular formation and its spreading and adhesive properties are poor. For the same reason the two solutions should be quite cold before mixing. Bordeaux mixture should be used as soon as possible after preparation, as it loses its gelatinous nature after several hours' standing and settles out in the granular form.

It sometimes happens that the lime used is of poor quality and the resultant mixture may then contain an excess of bluestone. This must be avoided, as the soluble copper salt is able to cause injury to the plant sprayed. An excess may be tested for by applying blue litmus paper (obtainable from a chemist) to the layer of clear liquid on the top of the spray. If the colour of the paper turns to red, more lime must be added until there is no change. A rough test is given by allowing a clean knife-blade or bright iron nail to remain in the mixture for a few minutes. If on removal this shows a brown coating of copper, more lime is required.

If a crop is to receive frequent and regular applications throughout the season, as is required for many of the foliage diseases, the above formula can be reduced to one consisting of 4 lb. of bluestone and 4 lb. burnt lime to 40 gallons of water. It is necessary to still further reduce the bluestone content for a summer spray for certain deciduous fruit-trees.

It is sometimes found convenient to make up a stock solution of bluestone and lime: 50 lb. of bluestone is dissolved in 50 gallons of water in a wooden vessel; 50 lb. of quicklime is slaked and water added to make up to 50 gallons. The solutions will keep well if protected from evaporation. One gallon of each will contain 1 lb. of bluestone or lime respectively, on which basis the necessary dilution before mixing for the preparation of any quantity can easily be calculated.

Certain proprietary mixtures, usually in the form of a paste or powder, are now on the market, for which it is claimed that they will form Bordeaux mixture on addition of the required amount of water, thus doing away with the trouble of preparing the home-made article. There are, however, some disadvantages in the use of these mixtures—

- (1) They are usually more expensive than the home-made spray.
- (2) The exact composition varies with the different makes, and it is therefore sometimes difficult to prepare a mixture of definite strength.
- (3) It is found that some of the ready-mixed powders do not give such a fine suspension as the home-made mixtures, so that their spreading and adhesive properties are poorer.

However, if a reliable brand is obtained, these mixtures serve a useful purpose for the treatment of a crop for which it is not desired to acquire the apparatus necessary for home mixing.

Lead arsenate and nicotine sulphate may be added to Bordeaux mixture to give a spray combining both fungicidal and insecticidal properties.

Bordeaux and Oil Emulsion.

This spray has been recommended largely for spraying citrus trees. The addition of the oil has two advantages. In the first place it acts as a spreader giving a better covering. Also it exerts a controlling influence on scale development, and thus counteracts to a certain extent the disadvantages sometimes arising from the killing of entomogenous or insect-destroying fungi by the Bordeaux itself.

Take of a good brand of red oil an amount equal to 1 per cent. of the total volume of spray to be used. Emulsify this thoroughly in one to two times its own volume of water, and then stir well into the mixed Bordeaux. Care must be exercised that the oil is well emulsified before adding to the Bordeaux.

Concentrated kerosene emulsion may be used in place of red oil, the amount used being calculated on the total kerosene present.

Bordeaux and Resin Sticker.

For use in districts subject to heavy tropical rains the adhesive properties of Bordeaux mixture may be increased by the addition of a resin mixture.

Dissolve 1 lb. of washing soda in 1 gallon of boiling water. Then add 2 lb. of resin, which may be crushed into small particles, and boil until the mixture is clear. One gallon of this when cool can be added to every 25 gallons of Bordeaux spray.

Bordeaux Paste.

This is often useful for painting wounds, pruning cuts, &c., to prevent the invasion of rot-producing organisms.

Slake 2 lb. of quicklime in $\frac{1}{2}$ gallon of water. Dissolve 1 lb. of bluestone in another $\frac{1}{2}$ gallon. Mix equal quantities of the two solutions to give the amount of paste required.

Burgundy Mixture.

This spray is more favoured than Bordeaux by some growers, as it is somewhat easier to prepare and can be used when good quicklime is not available. There is little to choose between the fungicidal values of the two mixtures when properly prepared.

Formula.

| | | | | | | |
|--------------|----|----|----|----|----|-----------|
| Bluestone | .. | .. | .. | .. | .. | 6 lb. |
| Washing soda | .. | .. | .. | .. | .. | 8 lb. |
| Water | .. | .. | .. | .. | .. | 40 galls. |

This can be reduced, when spraying is to be frequent, to a 4-5 $\frac{1}{4}$ -40 formula. The preparation is essentially the same as in the case of Bordeaux, using the washing soda instead of lime.

The washing soda may contain impurities, and it is therefore necessary to test for excess bluestone as in the case of Bordeaux. As an excess of soda, unlike lime, is known to cause injury in some instances, it is advisable to test the mixture with both red and blue litmus papers. If the blue paper is turned red, an excess of bluestone is present and more soda is required. If the red paper quickly turns a definite blue, too much soda has been used and more bluestone solution should be stirred in slowly until there is no colour change in the litmus.

Ammoniacal Copper Carbonate.

Bordeaux and Burgundy mixtures both have the disadvantage in that they leave a bluish-white covering over the surface sprayed. Ammoniacal copper carbonate, while somewhat inferior to these as a fungicide, can be used on fruit approaching maturity, since it is a clear solution leaving no stain.

Formula.

| | | | | | | |
|------------------|----|----|----|----|----|-----------|
| Copper carbonate | .. | .. | .. | .. | .. | 5 oz. |
| Strong ammonia | .. | .. | .. | .. | .. | 3 pints |
| Water | .. | .. | .. | .. | .. | 40 galls. |

Make the 5 oz. of carbonate of copper into a paste by the addition of a pint or two of water.

Add the 3 pints of concentrated ammonia to about 2 gallons of water in order to make the solution easier to handle.

Stir the copper carbonate paste into the ammonia water until dissolved or until no more will go into solution.

Add water to make up to 40 gallons.

Lime Sulphur.

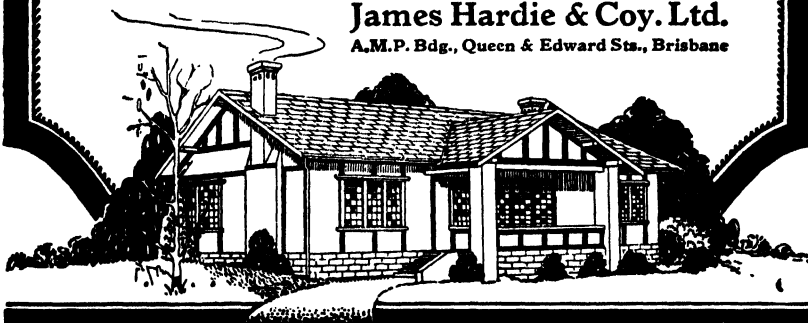
Lime sulphur, next to Bordeaux and Burgundy, is probably the most valuable fungicide at present in use. It is even more efficient than sulphur itself in the destruction of ectoparasitic fungi, the mycelium of which is destroyed by the fumes given off by certain of the sulphur

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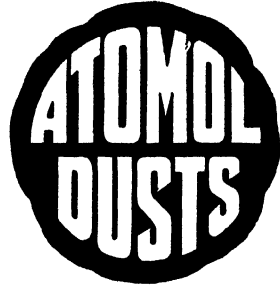
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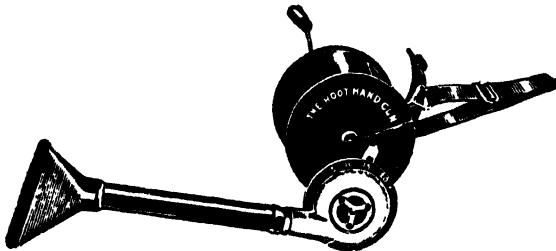
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| | Arsenate of Lead. | Nicotine. | Sulphur. | Copper. Carbonate. |
|---------------------|----------------------|-----------|----------|-----------------------|
| Tomato No. 1 | 30% | 2% | 40% | 64% |
| Tomato No. 3 | 13.5% | — | 40% | 64% |
| Grub & Aphis No. 1 | 13.5% | 2% | — | — |
| Aphis & Blight Dust | — | 2% | — | 16% |

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compounds contained in the spray. Used as a protective spray against the invasion of endoparasites, lime sulphur is less efficient than the copper preparations. Weighing against this disadvantage is the fact that lime sulphur has considerable insecticidal value in the destruction of scales and mites. It therefore can be used with advantage when spraying with Bordeaux would cause the destruction of the scale insect destroying fungi, leading to an increase of the insect pests. Lime sulphur can often be used as a summer spray for certain deciduous trees which would be injured by Bordeaux.

Lime sulphur can be bought in the concentrated form ready prepared, or can be made in the orchard. The latter procedure is the more economical for large holdings.

Formula for home-made lime sulphur:—

| | | | | | |
|--------------------|----|----|----|----|-----------|
| Flowers of sulphur | .. | .. | .. | .. | 100 lb. |
| Good burnt lime | .. | .. | .. | .. | 50 lb. |
| Water | .. | .. | .. | .. | 50 galls. |

About half the water is placed in an iron vessel and brought to the boil. The lime is stirred in while this is heating. The sulphur is then mixed into a paste and added, and the vessel stirred until the lime is slaked and the contents well mixed. The rest of the water is poured in and the mixture boiled for three-quarters of an hour to an hour but not longer. The orange-red liquid is strained from any sediment and stored in an airtight container.

The composition of the home-made lime sulphur and also some of the commercial brands varies considerably. Any grower using the spray in quantity should therefore test the strength of the concentrated solution before diluting for spraying. This is done by using a Baumé hydrometer, from which the density of the solution is read off in degrees Baumé. The strengths to be used for various applications are usually specified for lime sulphur of a 33 deg. Baumé as standard. The accompanying chart, adapted from that supplied by J. A. Campbell in the New Zealand "Journal of Agriculture," will enable sprays of correct dilution to be prepared from lime sulphur concentrate of various densities. First determine by means of a Baumé hydrometer the density of the lime sulphur to be used. Find the corresponding degree of density in the left-hand column. The figure in the same horizontal line in the column headed by the dilution required will give the amount of water to add to one part of the stock concentrated solution in order to give this dilution.

| Density of Stock Solution in Degrees Baumé. | | | | Dilutions Required, based on a 33° Baumé Standard. | | | | | | | |
|--|----|----|----|--|----------|----------|----------|----------|----------|-----------|-----------|
| | | | | 1 to 10. | 1 to 15. | 1 to 20. | 1 to 30. | 1 to 40. | 1 to 80. | 1 to 100. | 1 to 120. |
| 25° | .. | .. | .. | 7.6 | 11.4 | 15.2 | 22.7 | 30.3 | 60.6 | 75.8 | 90.9 |
| 26° | .. | .. | .. | 7.9 | 11.8 | 15.8 | 23.6 | 31.5 | 63.0 | 78.8 | 94.5 |
| 27° | .. | .. | .. | 8.2 | 12.3 | 16.4 | 24.5 | 32.7 | 65.5 | 81.8 | 98.2 |
| 28° | .. | .. | .. | 8.5 | 12.7 | 17.0 | 25.5 | 33.9 | 67.9 | 84.8 | 101.8 |
| 29° | .. | .. | .. | 8.8 | 13.2 | 17.6 | 26.4 | 35.2 | 70.3 | 87.9 | 105.5 |
| 30° | .. | .. | .. | 9.1 | 13.6 | 18.2 | 27.3 | 36.4 | 72.7 | 90.9 | 109.1 |
| 31° | .. | .. | .. | 9.4 | 14.1 | 18.8 | 28.2 | 37.6 | 75.2 | 93.9 | 112.7 |
| 32° | .. | .. | .. | 9.7 | 14.5 | 19.4 | 29.1 | 38.8 | 77.6 | 97.0 | 116.4 |
| 33° | .. | .. | .. | 10.0 | 15.0 | 20.0 | 30.0 | 40.0 | 80.0 | 100.0 | 120.0 |
| 34° | .. | .. | .. | 10.3 | 15.4 | 20.6 | 30.9 | 41.2 | 82.4 | 103.0 | 123.6 |
| 35° | .. | .. | .. | 10.6 | 15.9 | 21.2 | 31.8 | 42.4 | 84.8 | 106.1 | 127.3 |

Lime sulphur as a winter spray for deciduous trees, or as a winter dressing for the trunk and branches of citrus, can be used at a dilution of 1 to 10 or 1 to 15. At 1 to 40 it can be used as a general summer spray for citrus. As a summer spray for deciduous fruits, dilution of from 1 to 80 to 1 to 120 becomes necessary.

It may be advisable to increase the spreading qualities of lime sulphur by the addition of a casein spreader.

Sulphur.

Sulphur applied as a dust is used extensively for the control of the powdery mildews caused by species of the *Erysiphaceæ*.

Sulphur dust may usually be obtained in two forms—

- (1) Ground sulphur consisting of lump sulphur ground to a powder of varying degrees of fineness.
- (2) Sublimed or flowers of sulphur formed by the condensation of sulphur vapour obtained by burning ordinary sulphur.

Sublimed vapour is often finer than many of the commercial brands of ground sulphur, but it possesses the disadvantage of containing small quantities of free sulphuric acid which may cause some foliage-burning and also make the application disagreeable to the operator. Ground sulphur is quite equal to flowers of sulphur when in the same state of division. It loses its bright yellow colour with increased fineness, and good ground sulphur should always be a lighter yellow than the sublimed form.

Fineness of the particles is of the greatest importance, as it confers on the sample greater covering power with more even distribution and better adherence. Fine division is also conducive to greater evolution of the fumes to which sulphur owes its fungicidal properties.

Lime to the extent of 25 to 50 per cent. is sometimes added to the sulphur. This enables a more thorough application to be made than would otherwise be economically possible. It also reduces the chance of burning should the sulphur contain an excessive quantity of free acid.

A still warm day should be chosen for sulphuring, and if the dust is applied while the dew is still on the leaves better adherence will be obtained.

Disinfectants.

The use of disinfectants may be necessary for the sterilisation of seeds of plants subject to seed-borne disease, or the vegetative parts such as tubers, suckers, &c., used for propagation purposes. Seed-beds are also treated with advantage if the ground is suspected of harbouring disease.

Seed disinfection is especially desirable when planting crops liable to seed-borne disease on new land or land that has received rotation. The danger of introducing disease to a clean area by means of contaminated seeds is thereby lessened.

The chemicals commonly employed for the purpose are corrosive sublimate (mercuric chloride) and formalin (40 per cent. solution of formaldehyde).

Owing to the great variation exhibited by these disinfectants in their action on different seeds and fungus spores, no general method can be given for their use. Corrosive sublimate is commonly used at a

strength of 1 part in 1,000, i.e., 1 oz. to 6½ gallons of water. Small quantities of solution are more easily prepared by the use of tablets obtainable from a chemist. The solution will corrode metal containers, which have therefore to be avoided. The time of immersion varies with the variety of seed employed from about five minutes to half an hour. When treating tubers, cuttings, &c., longer periods can be used. Great care must always be taken when working with corrosive sublimate, as this chemical is a deadly poison.

Formalin is used at a strength varying from ¼ per cent. to 2 per cent., depending on the time of immersion and the material to be treated. To make a 1 per cent solution, add 1 oz. of formalin to 5 pints of water. Other strengths may be calculated from this. The time of immersion varies as in the case of corrosive sublimate.

For these treatments seed is conveniently handled by tying in cheesecloth or a similar open material.

A certain amount of seed injury or retardation of germination sometimes follows disinfection. This undesirable result can largely be eliminated by soaking the seeds in water before immersion in the disinfectant, and washing for five to ten minutes in several changes of clean water after treatment. The pre-soaking provides for less absorption of the poisonous fluid into the interior of the seed, while the subsequent washing removes any injurious compound which might continue its action after removal from the main supply. The seed after washing should be spread out to dry, and then sown as soon as possible.

In Europe and America certain organic mercury compounds are now available for seed disinfection which are proving in many cases superior to the chemicals used in the older methods.

Soil Sterilisation.

By far the best method for carrying out soil sterilisation is by means of steam. This is, however, impracticable for the average grower. Small areas of ground such as seed-beds may be sterilised by means of formalin. The beds are prepared ready for planting and then watered with formalin solution of 1 to 2 per cent. strength at the rate of 4 gallons to the square yard. The beds as soon as treated are covered with sacking, &c., for a few days to keep in the fumes, and then after airing for about a week are ready for use.

When diseases such as damping-off make their appearance after planting, the spread may often be checked by the application of a mixture known as Cheshunt compound. It is prepared as follows:—

Two ounces of powdered bluestone (copper sulphate) is mixed thoroughly with 11 oz. of crushed and powdered rock ammonia (carbonate of ammonia). This stock mixture should be kept in a stoppered bottle. It is dissolved in water at the rate of 1 oz. to 2 gallons, and the solution then watered on the soil so as to thoroughly wet it. The solution can be held in wooden or copper vessels only.

JOURNAL APPRECIATED.

A Kingaroy farmer writes (13/4/29):—I wish to express my appreciation of the Queensland Agricultural Journal, which I look forward to every month.

QUEENSLAND RAIN FOREST TREES.

By W. D. FRANCIS, Assistant Government Botanist.

The Water Gum (*Tristania laurina*) is most commonly found in forests along watercourses. The picture of the stem of the tree shows the pattern of the bark. The wood is very finely grained, and is pale or brownish in colour. It is fairly heavy. In the "Queensland Flora" it is stated that the wood is useful for tool handles. The species is found as far north as Gympie in Queensland, and extends into Gippsland in Victoria.

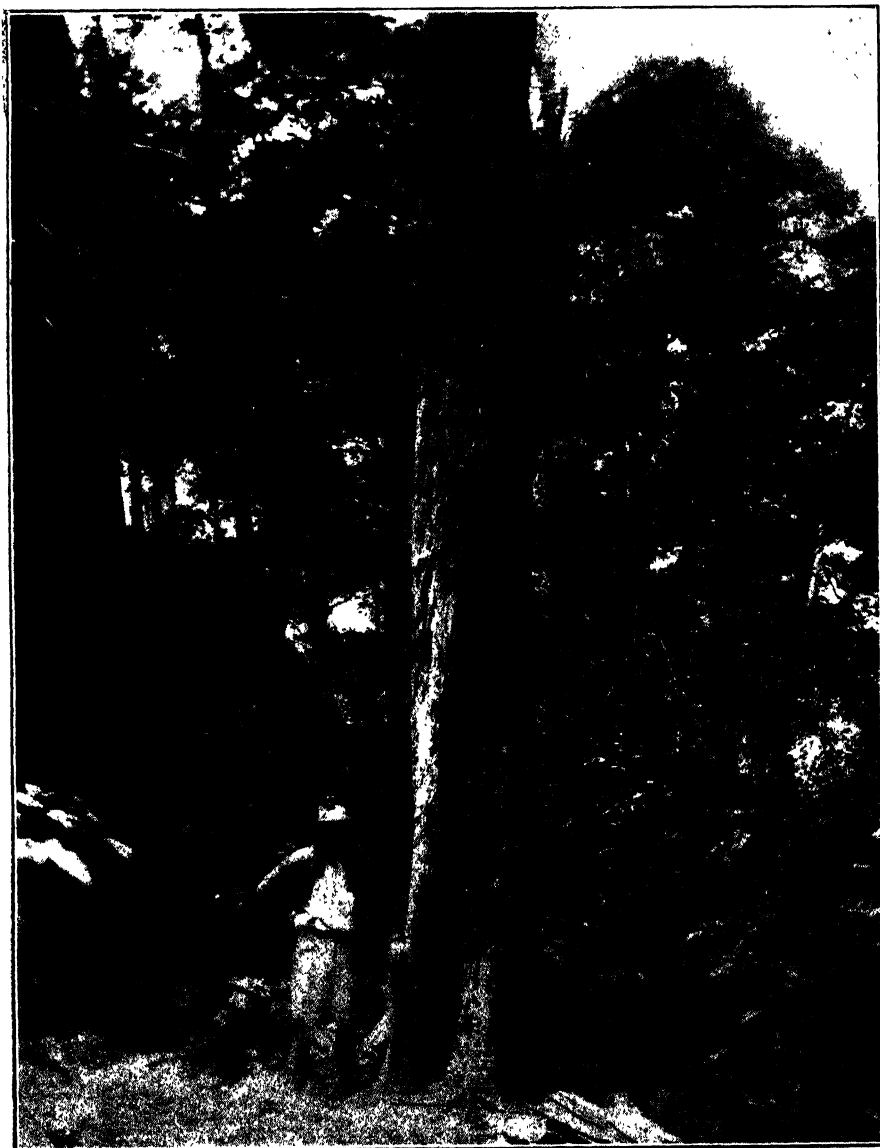


Photo. : W. D. Francis.]

PLATE 108.—WATER GUM (*Tristania laurina*).

[A tree in the Rain Forest of Robert's Plateau, Macpherson Range. The tree on the extreme left is the Scrub Box (*Tristania conferta*).]



Photo.: Dept. Agriculture and Stock.]

PLATE 109.—WATER GUM (*Tristania laurina*).
A. Flowering shoot; B. Capsule-bearing shoot.

QUEENSLAND SHOW DATES, 1929.

The following is the official list of Queensland Show Dates for 1929, as issued by the Queensland Chamber of Agricultural Societies:—

Bundaberg: 13th to 15th June.
Bororen: 17th and 18th June.
Gatton: 19th and 20th June.
Gladstone: 19th and 20th June.
Mount Larcom: 21st and 22nd June.
Buderim Mountain: 22nd June.
Rockhampton: 26th to 29th June.
Esk: 28th and 29th June.
Wynnum: 30th and 31st June.
Mackay: 2nd to 4th July.
Kilcoy: 4th and 5th July.
Townsville: 9th to 11th July.
Woodford: 11th and 12th July.
Home Hill: 12th and 13th July.
Samford: 12th and 13th July.
Woombye: 12th and 13th July.
Charters Towers: 17th and 18th July.
Caboolture: 18th and 19th July.

Ingham: 19th and 20th July.
Rosewood: 19th and 20th July.
Barcaldine: 23rd and 24th July.
Laidley: 24th and 25th July.
Nambour: 24th and 25th July.
Ayr: 26th and 27th July.
Bowen: 31st July and 1st August.
Maleny: 31st July and 1st August.
Nundah: 3rd August.
Royal National: 12th to 17th August.
Crow's Nest: 21st and 22nd August.
Goombungee: 30th August.
Malanda: 18th to 19th September.
Pomona: 18th and 19th September.
Kenilworth: 28th September.
Rocklea: 28th September.
Pine Rivers: 15th and 16th November.

RURAL LIFE IN OTHER LANDS.

BY THE EDITOR.*

Some years ago, when looking around post-war Europe, visiting different countries, seeing something and learning something of the ways of life, of the customs and accomplishments and general racial characteristics of other peoples—it was a very liberal education, by the way, especially for an Australian—one was everywhere impressed with the density of rural populations and the intensity of cultivation on soils that seemed to a Queenslander hungry enough to turn a bandicoot into a bolshevik. One thought naturally what a country Australia would be, what a State Queensland would be, if it only had a country population of a tenth part of the numbers that inhabit the rural regions of Western Europe.

Racial Resemblances.

Another thing that struck one was the physical similarity of the Continental races, and despite the dicta and dogma of pro-Nordic enthusiasts, there was, or it seemed to me on appearances anyhow, very little difference among the several races besides language, customs, mentality, and creeds.

In the far north of Scotland, in Caithness and Sutherlandshire, one was privileged to meet people of the pure Scandinavian type, whose family names were, obviously, of Norwegian, Swedish, or Danish origin. In Sweden, Norway, and Denmark, and parts of Germany one would meet with types almost exactly similar to those one met in Scotland. In Ireland and Wales one could observe many points of similarity, from the racial viewpoint, with Bretons and other French people of the Biscayan and Mediterranean provinces.

The same points of resemblance were noted as regards British people, Dutch, Belgians and, to a lesser extent perhaps, Italians, of the northern provinces of Italy particularly. In all these countries the Nordic strain seemed to be strong, that is if one could judge by the number of blonde Italians, Frenchmen, and others one met with; while on the other hand the swarthinness of many Englishmen, Scotsmen, Irishmen, and Welshmen, and the Continental races was often very strongly in evidence. Perhaps no better opportunity was ever given the student of humanity—of the white races particularly—than that afforded him in France during the war. There could be met the representatives of every European race, and every type of each race drawn from a variety of home and overseas environment; and beyond manners, dress, and speech, there did not seem very much to distinguish them. One of the finest physical specimens of manhood in the mass I ever saw, by the way, was a reserve division of the French Army drawn from the Alpine Provinces—all picked men, of course, none younger than twenty-five and none older than thirty-five.

When you come to think of it, however, the resemblance of one European race to another is not very remarkable. The Romans (the Italians of the time) occupied Britain for three centuries. Northern peoples, at times, swept down through France and Italy. Vikings invaded Scotland, and the Danes and Normans, descendants of the old predatory Norsemen, invaded England and Ireland. Then, of course, there were the people, the Huguenots and Flemings, for instance, who sought sanctuary in the British Isles; and also those of the British Isles, who, in times of political stress, sought a similar sanctuary on the Continent. In addition, there were the peaceable comings and goings of the several peoples, which despite distance and indifferent transport must have been always going on. The distance from England to France was after all no further than from, say, Wynnunum to Cape Moreton, and at one point, Dover to Calais, not much further, if as far, than from Brisbane to Bribie.

This, however, is not a talk on racial problems or racial distribution. In these few opening remarks it is my purpose to suggest merely that, after all, there is much in common between the several European countries. The struggle for existence is the same everywhere and is just as keen in one country as another. Their rural life is more or less common in its simplicity; its very practical endeavours; its sound husbandry, varied, of course, in its evolution from local environment; and, socially speaking, its more or less neutral tints.

A Glance at Rural France.

It is always interesting to look over the other fellow's work when interests are common, to go through his paddocks to see what he has done and how he has fared; and with that idea it is proposed to take a rapid glance at rural France, the

* From a series of radio lectures through 4QG.

Continental country one knows best of all, and, perhaps from a temporary very close association with its thrifty and kindly peasant people, one appreciates best of all, as the first scene in our survey of rural life in other lands.

France is essentially an agricultural country. In 1911, 55.8 per cent. of the inhabitants lived in rural districts and in towns and villages of less than 2,000 inhabitants. There, as elsewhere in the world, is a steady drift from the countryside to the city. This drift has been going on for the last 130 years, intense industrialism being the main cause. Agriculture, however, is still the predominant industry in France, over 40 per cent. being engaged directly in farming. This cityward trend of rural population has become a very serious thing in a country of a very slowly increasing or static population. In any country where the general rate of increase is rapid, such a condition could not create alarm, for marching with the city expansion country districts would in the ordinary course receive a healthy addition in absolute numbers.

Agriculture in France suffered the greatest relative reduction in actual numbers, and probably the greatest reduction in physical well-being of any industry, during the war operations, and since the war the young men have been abandoning the rural districts, so that farm work to-day is being left more and more to women, old men, children, and disabled ex-soldiers.

In 1920-21, the situation became very acute, and foreign labour, Italians largely, had to be brought in to cope with the shortage of labour in the agricultural areas. During the war France lost 1,636,000 of those engaged in war operations. In addition, deaths among civilians exceeded births by 944,000—nearly a million more to add to the awful deficit—and that number does not include, for the period, the figures for Alsace-Lorraine. In 1919, there were 233,000 excess civilian deaths in France, including Alsace-Lorraine. Thus, France entered upon reconstruction at the beginning of 1920 with a loss of population approximating at least 2,813,000—nearly 3,000,000 deaths, most of which made up the frightful price of freedom paid in human life. Probably two-thirds of this number represented effective man power, and farm labour was depleted through these losses of man power. The depletion of farm labour is not indicated alone by the actual numerical decrease in farm population, for, according to recent reviews, the effectiveness of men still living in rural communities is lessened because of disease and mutilations incidental to the war.

Various estimates have been made of the devastation in the war zone, though, of course, the limits of the area affected by war operations varied from time to time. The maximum area invaded is estimated at 10,514,325 acres, about a thirteenth part of the country, of which 8,242,989 acres were occupied for a long time. The area of devastated agricultural country in the war zone exceeded 4,750,000 acres; and losses of livestock in the ten occupied Departments exceeded 50 per cent. of the 1909-1913 average.

Outside the war zone lack of man power forced millions of acres out of cultivation, and Government requisitions reduced French herds by millions of animals.

How Changing Economic Conditions were Met.

Coming back to generalisations, consciously or unconsciously the French farmer has exhibited marked acumen in his adjustments to the changing economic conditions throughout the world during more than three-quarters of a century.

The world market was flooded with cheap cotton from America and the French farmer abandoned his fields of flax and hemp and restricted his production of fibres, as cheap factory-made cotton goods replaced homespun woollens and linens. The world market was flooded with wheat and the French farmer intensified live stock production. The world market was flooded with wool and the French farmer emphasised meat production. The world market is now, or was until recently, being flooded with frozen beef, mutton, and pork and the French farmer is manifesting a tendency to concentrate on dairy production.

Agricultural Development Determined by Economic Expediency.

In France, more than in any other country in Europe, trends in agricultural development have been determined by economic expediency. Wheat acreage was abandoned not so much because wheat production in France was less profitable, but because there was greater profit in animal husbandry, and for thirty years before the war wheat areas and the production of animal products fluctuated with the variations in the ratio of the price of bread to the price of meat in Paris.

The intensification of animal husbandry took the form of improvement in weight and quality of marketed animals, and although the records of milk production are fragmentary export data indicate a similar expansion of the dairy industry. More and better feeding stuffs were in demand.

During the twenty-one years preceding the war, the production of field crops largely for home consumption and for feeding to live stock became an established farm policy. Cereals came to occupy a minor place among the marketable surpluses of the farm, which for the most part took the form of milk, butter, cheese, eggs, poultry, and wool, with an occasional animal taken to town on market days. Just before the war the sales of animals and animal products accounted for 70 per cent. of the cash income of the typical middle-sized French farm.

Not only had the acreages under wheat and other cereals become restricted, but there was a marked decrease in the acreage of industrial plants and all other field crops except fodder and forage. An outstanding phenomenon of this period was the marked expansion of grazing areas. France was surely going to grass; but was doing so through an intensification of agriculture on the best lands and the abandonment to permanent pasture of the hungrier country which had not proved sufficiently profitable to continue to cultivate.

These changes from extensive field-crop production to intensive animal husbandry was a response to the effect of the economic factors involved in profit and loss, but they were also intensified and hastened by a city-ward movement of country population.

In a country like France, in which for a decade or more before the war the population had been practically static and immigration limited, the rapid growth of cities could take place only at the expense of rural communities and to the detriment of agriculture.

In the next lecturette of this series other trends of agriculture in France, which may be useful in a consideration of some of our own rural problems in Queensland, will be briefly discussed.

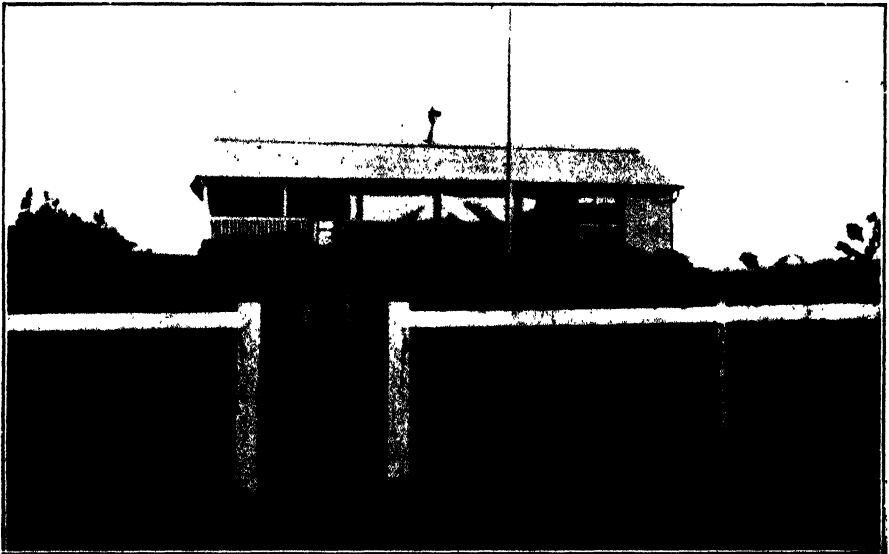


Photo.: Dept. of Public Instruction.]

PLATE 110.—A COUNTRY SCHOOL IN QUEENSLAND.

The children attending our country schools are often keen gardeners, and this picture shows the beautiful results of well-guided enthusiasm.

REMOVAL OF COTTON STALKS.

W. G. WELLS, Director of Cotton Culture.

The removal of the cotton stalks at the end of the harvesting operations has constituted something of a problem to the average cotton-grower in Queensland. In the course of the early stages of the present revival of cotton-growing several plans were tried varying from cutting the plants by hand with either cane knives, large sharpened eye hoes, or grubbing hoes, to mowing them down with the ordinary mowing machine. All methods were more or less unsatisfactory, and most growers finally resorted to either ploughing the old crop under when they performed the regular ploughing operations, or ploughing out the plants with a shallow setting of a one-disc plough and then forking the uprooted plants into piles and burning them.

Both of these latter methods are not desirable for several reasons. Generally speaking, little or no rain occurs during the late winter and early spring months, and under such dry conditions it is exceedingly difficult to prepare a compact seed-bed where any cotton plants are turned under in the ploughing operations. Where the seed-bed is of an open nature, it is often impossible to obtain a satisfactory permanent strike if only light planting rains occur. The grower in such a case is then faced with the problem of deciding if it is better to prepare for a replant or to carry on with what stand he has and not gamble on the occurrence of further rain in time for another planting. Generally, he decides in favour of leaving it, and many crops are seen each season with very poor stands, which will prevent the grower from obtaining the maximum possibilities of his soil no matter how well he farms it. In fact, one of the outstanding causes of the large number of low yields which occur every season is the failure of many growers to obtain anything approaching a good commercial strike. If each grower would only endeavour to obtain a perfect 2-foot spacing over the full length of, say, twenty adjacent rows in any part of his field selected at random, it is believed the results would be so surprising that much greater attention would be paid to every factor which has a bearing on obtaining and maintaining a perfect stand.

Another point which makes it undesirable that the old cotton plants be either ploughed out and then forked up or ploughed under in the regular soil-breaking operations is the prevalence of certain insect pests of cotton in Queensland. Two of these over-winter in the bolls, and any operation which ploughs them under the soil does not necessarily destroy them. These insects are the peach grub (*Conogethes punctiferalis* Gn.) and the pink boll worm (*Platyedra gossypiella* Saunders). The former occurs in all of the coastal and Southern areas, while the latter is found in the coastal areas north of Maryborough and in the inland valleys of Central Queensland. The caterpillars of both insects can do serious damage, as many cotton-growers in the coastal areas can testify, and all growers should make every effort to obtain as thorough a clean-up as is possible.

Experiments in recent years by growers and on the Callide Cotton Research Station have demonstrated that a machine can be made which will cut off the cotton plants and leave the land in such a state that the plants and most of the bolls can be easily cleaned up and burned. This machine is only a modification of the ordinary maize slide-cutter, and any grower can construct one at small cost.

The accompanying illustrations show a light one-row machine, which was constructed from bush timber, and a two-row machine. The former one was made by Mr. W. Fuller, of the Wowan district, who has used it for the last couple of seasons. The efficiency of the machine is clearly demonstrated by the fact that each season he has many requests for the use of it by his neighbours. Up to 6 or 7 acres of cotton plants can be cut in a day with this machine drawn by one average-sized horse. The experiences of this grower and his neighbours would indicate that such an implement is entirely suitable for a crop of moderate area.

The two-row machine was designed on the Callide Cotton Research Station, and represents a solidly constructed implement which can be drawn by a team of horses or by a tractor. At the Research Station, up to 13 acres can be cut in an eight-hour day with a tractor, even in plants of around 5 to 6 feet in height.

The same features are included in both of these machines, only, two rolling coulters and two 6-foot knife blades are required in the large machine, where only

one of each is necessary in the smaller one. It was found that some steadying effect was necessary to assist in keeping either machine going in a smooth, straight line, and this was best accomplished by means of the rolling coulter used on a plough. In the one-row machine it is attached on the back of the main beam which is drawn down the centre between two rows; the angling arm, with the knife attached, runs against the row of plants to be cut, thus pressing the knife against the base of each plant at the ground level. The coulter is set on top of the beam over a long slot in it, so that some 4 inches runs in the ground and thus prevents any sliding off to the side by the machine when the blade presses against the plants. The two illustrations of the two-row machine show how the coulters and blades are attached to it.

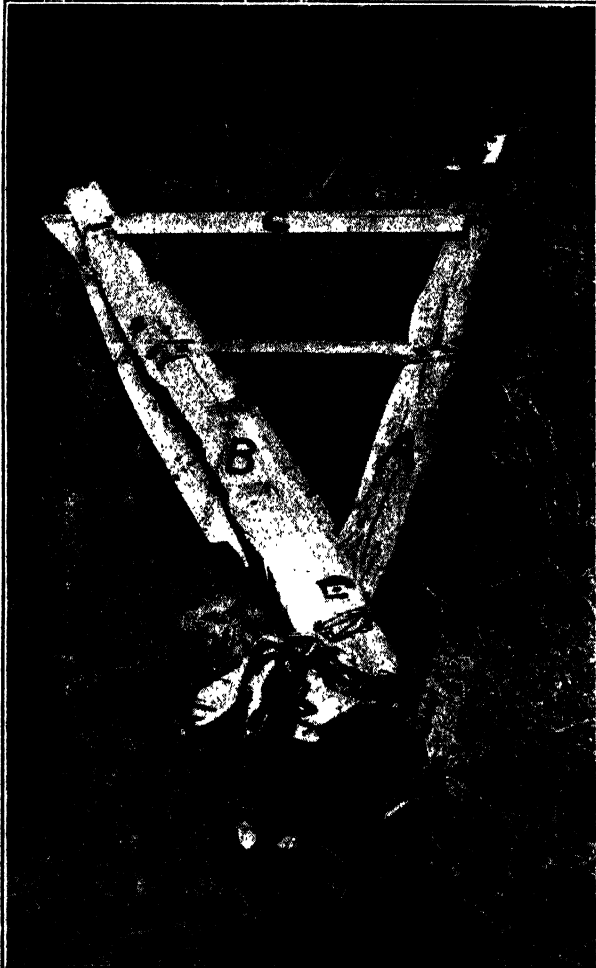


PLATE 111 —ONE-ROW SLIDE CUTTER.

Length of A, 10 feet. Length of B, $9\frac{1}{2}$ feet. Length of C, 4 feet. Knife made of worn-out crosscut saw, and is fastened on lower side of B by means of bolts and a full-length piece of 4-inch by 1-inch hardwood. The latter braces the saw and thus prevents the soil from bulging it between the bolts when the machine is being dragged along the row. Diameter of coulter at end of A is 15 inches. Bearings of hardwood.

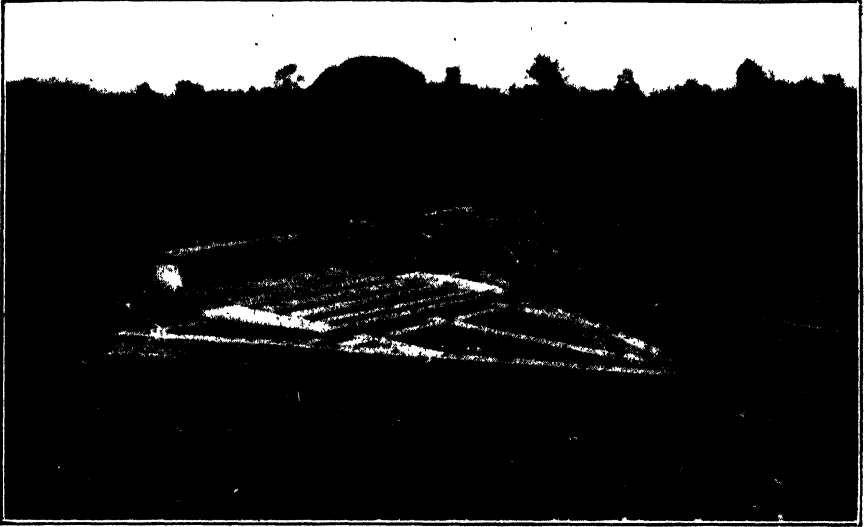


PLATE 112.—SLIDE CUTTER.*

An adaptation of the old-fashioned maize cutter, for cutting cotton plants. The box at the rear is a guard over two rolling coulters, which serve to steady the machine so that it cuts more efficiently.

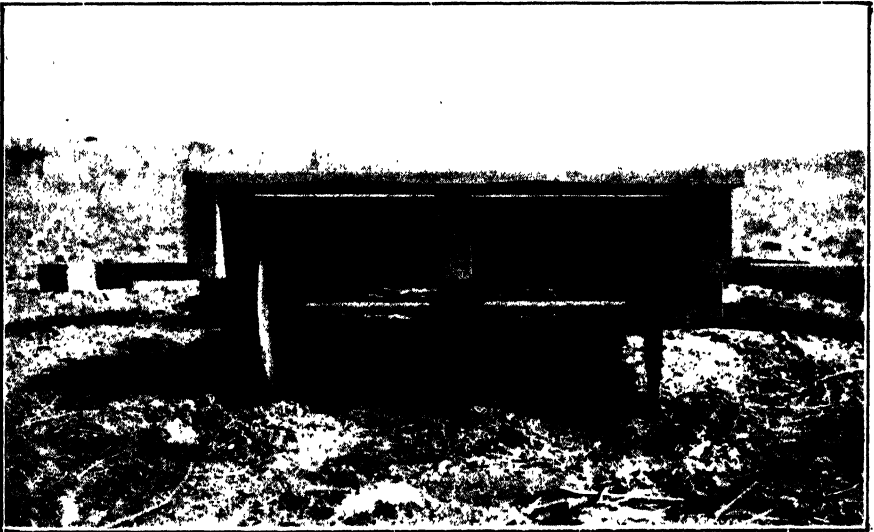


PLATE 113.—REAR VIEW OF SLIDE CUTTER.†

Showing the method of attaching the rolling coulters. These are of decided assistance in steadying the machine, which has a tendency to swing from one row to the other owing to the irregularity of the spacing of the plants.

* After the photograph was taken it was found that a 6-foot blade, instead of three sections of saws, gave better results. Width of saws should clear frame by 3 inches.

† Dimensions of machine are as follow:—Length, 10 feet; width at widest point, 7 feet; width of back carriage, 3 feet; length of arms, 8 feet 6 inches; framework, 4 inches by 3 inches (hardwood).

The plants, after they are cut, can be rolled into piles by means of the ordinary spike-tooth or lever-tooth harrow. The method used on the Research Station is to join three sections of harrows together and drag them crossways of the rows. The plants gradually pack under the harrows until the compact mass partially sweeps up the field. (Some difficulty may be experienced by the bolls sliding under the mass where grassy conditions have been allowed to develop.) Eventually sufficient plants accumulate to force the harrow up and over the roll of them, thus obtaining an automatic self-dumping effect. The plants can be quickly cleaned up in this manner into large wind-rows, and as soon as sufficiently dry will readily burn. It is suggested in this respect that the grower experiment to ascertain when to rake the plants up. They should not be allowed to dry out too thoroughly, because the bolls will open and the seed cotton will drop out and be left on the ground. It can thus be seen that the removing of the plants offers no difficulties, and every grower is advised to equip himself with a machine suitable for his requirements in order that the old crop can be quickly removed.

The early destruction of the old plants is highly desirable. Each season illustrations are met with where the growers delay the destruction of the old plants in the hope of obtaining the top crop of bolls which nearly always remain after the main pickings have been completed. Numerous examinations of such crops have shown that usually only a small percentage of the upper bolls of three-quarter size or larger contain cotton of much value. Generally, the fibres are short and weak and often are badly stained. Usually such crops are held over where no frosts have been experienced, and the grower hopes to obtain a light picking to make up for a low yield. It is difficult to advise just what indicators to use to ascertain if it is worth waiting for such bolls. In the inland valleys it is believed that usually the grower would be wise if he calls a poor crop a "poor one" and wasted no time in preparing for his next season's crop if he intends to plant again on the same land.

The experiences of the majority of the growers in every district and the experiments at the Research Station all indicate the advisability of early planting.

In this connection it may be of interest to present the results of the time of planting experiments which have been conducted at the Callide Cotton Research Station. These are as follows:—

YIELDS IN TIME OF PLANTING EXPERIMENT.

| <i>Season 1924-25.</i> | | | |
|------------------------|--------------------------------|------------------|--|
| 7th October planting | .. .. . | 912 lb. per acre | |
| 10th November planting | .. .. . | 855 lb. per acre | |
| 19th December planting | .. .. . | 220 lb. per acre | |
| 15th January planting | —Not picked; failed to mature. | | |

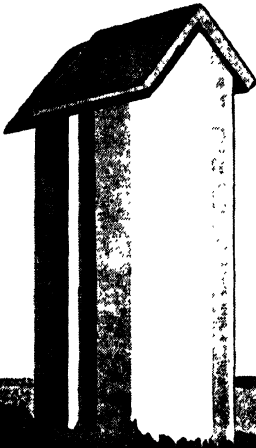
| <i>Season 1925-26.</i> | | | |
|------------------------|---------|------------------|--|
| No October planting.* | | | |
| 5th November planting | .. .. . | 933 lb. per acre | |
| 15th December planting | .. .. . | 116 lb. per acre | |

| <i>Season 1926-27.</i> | | | |
|------------------------|------------------------------|----------------------|--|
| 2nd October planting | .. .. . | 1,071.5 lb. per acre | |
| 22nd December planting | —No yield; failed to mature. | | |

| <i>Season 1927-28.</i> | | | |
|-------------------------|---------|--------------------|--|
| 12th September planting | .. .. . | 1,734 lb. per acre | |
| 5th October planting | .. .. . | 1,180 lb. per acre | |
| 30th November planting | .. .. . | 207 lb. per acre | |
| 21st December planting | .. .. . | 157 lb. per acre | |

* No October planting was obtained in the experiment. Plantings in mid-September on another part of the station produced from 922 to 1,473 lb. per acre.

Usually in most districts the first rains in the springtime do not occur until it is warm enough to plant, and if a well-prepared seed-bed has been established a good strike of a permanent nature is generally obtained. It is where the seed-bed is faultily prepared that difficulties are experienced in either obtaining a good strike or maintaining it during the hot, dry periods which are often encountered in October and November. The contributing factor in such cases is generally the delay in starting the ploughing operations. Usually during the first part of June rains occur, and if the preparation of the new seed-bed starts in time to obtain the full benefits of this moisture, a good seed-bed can be obtained. The ploughing is often delayed because of the length of time elapsing in the operations connected with removing the old crop. It is believed, therefore, if each grower equips himself with the most suitable of these cheaply constructed slide cutters, shown in the included illustrations, this delay can often be avoided and a much better chance of securing a good permanent stand will be obtained.



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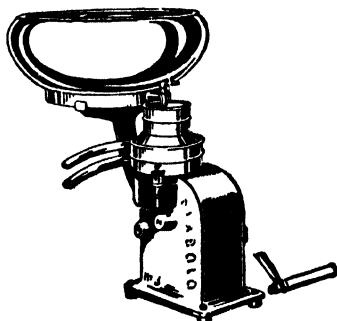
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| 30 " | 12 5 0 | 115 " | 40 15 0 |

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STERILISING DAIRY UTENSILS.

Hot Water.

The practice of scalding utensils with boiling water is still the commonest method of sterilisation. Successful results depend on (1) the temperature of the water and (2) the quantity of water used. Hot water poured around the sides of a can rapidly cools to a point where it is no longer effective in destroying bacteria; the smaller the quantity used, the more rapid the cooling. Experiments have shown that, for an 8-gallon can, *a quart or more of boiling water is required to sterilise it effectively*. It is therefore essential that provision be made for an abundant supply of boiling water; a teakettleful from the kitchen cannot be expected to do the work of sterilising cans, buckets, strainers, separator bowl and discs, &c. A wash boiler or tank set upon a coal, oil, or laundry stove in the milkhouse is a great help in providing hot water for washing, and boiling water for scalding the utensils.

The scalding of buckets, strainers, &c., is very simple, and, if enough boiling water is used and all the inner surface is treated, it destroys and removes large numbers of bacteria. With cans, however, in addition to pouring the boiling water around the sides, it is well to replace the lid, and then roll the can along the floor on its side for three or four complete revolutions to make sure that every inch of the inner surface is treated. Before emptying out the water, the lid may be treated by inverting the can for a few seconds.

Another method of hot-water treatment is useful where the number of utensils to be treated is large. In this method the utensils are immersed for a minute or two in a tank filled with boiling water. The results obtained are superior to those where the utensils are merely rinsed, due to the higher temperature reached, the longer period of contact, and the more complete treatment of the entire surface.

With either method rapid drying-out of the remaining moisture takes place when the utensils are immediately placed on a draining-rack. For the sterilising of dairy utensils, steam has been found to be a suitable, economical, and effective agent.

Chlorine Compounds.

Few farms are adequately equipped for properly sterilising utensils by either the steam or the hot-water method. As an alternative, a method has been devised by which the germ-killing properties of chemicals of the chlorine group, have been utilised. In this method the chemical is dissolved in cold water (thus saving fuel and time) and the utensils are treated with this solution. Because of the greater convenience of this method, it is being widely used, both in the milk plant and factory and on the farm, and, where applied intelligently, is giving results which, in many cases, surpass those obtained by the hot-water rinse method.

Intelligent application of chemical sterilisation requires recognition that its efficiency depends upon—

1. The use of a solution of sufficient strength.
2. A sufficiently long period of contact between the solution and the entire inner surface of the utensils.
3. The absence of milk residue, dirt, or other organic matter which destroys the sterilising power of the solution.

There is nothing complicated about the method, but it is not foolproof, and, unless the above simple conditions are fully met, the results may be disappointing.

The germ-killing power of chlorine disinfectants is proportional to the free or available chlorine which they contain. This free chlorine is constantly being liberated and lost, resulting in a more or less rapid decrease in strength, particularly in dilute solutions as prepared for use. Consequently, it is better to make up only enough rinse solution for use at one time, utilising the discarded solution for deodorising floors, drains, &c., in the milkhouse or stable. Either a commercial product may be purchased or a home-made hypochlorite stock solution prepared from which the rinse is made up. The commercial products are usually more reliable as to strength and are very convenient, but are rather more expensive than the home-made solution. With the latter care must be taken to obtain a fresh, non-caked supply of chloride of lime, since this material tends to lose its strength during storage, old stock being often so weak as to be almost worthless for sterilising purposes.

The period of contact with the sterilising solution is obviously important. As with hot water or steam, the longer the exposure to the sterilising agent, the more

complete the action. With chemical sterilisation this must not be less than ten seconds for every portion of the utensil which comes in contact with the milk.

It should not be necessary to dwell upon the third factor—the absence of dirt, milk, &c., from the utensils. Unless these are first of all properly cleaned, no method of sterilising treatment can be expected to give satisfactory results, and least of all the chemical method. *Thorough cleaning is a fundamental necessity.*

Home-made Hypochlorite Solution.

For the benefit of those who wish to make up their own hypochlorite solution, the following directions are included.

Obtain a 12-oz. can of the very best grade of chlorine of lime, fresh, non-caked, and preferably marked with the available chlorine content. Carefully mix the contents of this can into a paste with a little water, gradually adding water enough to make it up to 1 gallon. To this, add 2½ lb. of sal soda. The mixture should be kept in a glass or earthenware vessel, and not in a metal container, because of its corrosive action. Allow it to stand for twenty-four hours to settle, then siphon off the clear liquid from the top. This constitutes the *stock solution*, and is just as effective as the commercial hypochlorite or chloramine compounds. It should be kept in a dark-coloured bottle or jug, tightly stoppered, and in a cool, dark place.

In preparing a solution for rinsing utensils, add four tablespoonfuls of this stock solution to 2 gallons of clean cold water in a bucket. This rinse may then be poured from bucket to bucket, allowing it to remain for ten to fifteen seconds in each. Then it may be poured into a can, the lid replaced, and the can rolled along the floor for half a minute. With properly cleaned utensils, 2 gallons of rinse is sufficient to treat a dozen 8-gallon cans or their equivalent before weakening too much to be effective. Make up a fresh rinse at each milking. Where a commercial product is used, the manufacturers' directions for making up the rinse should be followed.

Where a large number of utensils is to be treated, this may be done more conveniently by immersing each one for ten seconds in a tank or wash vat full of the solution. The solution should be emptied out after use, and a fresh quantity made up for the next time.

Drying Utensils.

With any form of sterilising treatment (except pressure steam for twenty minutes), a few highly resistant organisms survive. At ordinary temperature these will multiply at an astonishing rate in the traces of moisture remaining inside the can, and may thus undo all that was accomplished by the treatment. In fact, experiments have shown that cans which were washed, but not scalded, and placed on an outdoor draining rack contaminated the milk less than cans which were washed, thoroughly scalded, drained, and then stood indoors with the lids on. The unscalded cans at first contained many more bacteria, but the rapid drying of the cans prevented these from multiplying, so that at the end of five hours the descendants of the few bacteria surviving in the scalded, but not dried, cans outnumbered them. Had the cans been held for a longer period, the advantage would have been much more strongly in favour of the dried cans.

The importance of dry cans is fully realised in every up-to-date dairy. In all cases where cans show moisture inside, it is essential that they receive one of the sterilising treatments outlined, and, unless they are to be used at once, they should immediately be allowed to dry by placing them on an open-air draining rack exposing the utensils to the action of both sun and wind. The utensils are inverted and placed on such a rack immediately following the sterilising treatment, the traces of moisture soon disappear, and bacterial growth is checked. On no account should a cloth be used for drying the utensils, for such a practice is bound to add thousands of bacteria to the can surface. The draining rack is simpler, takes less time, and gives far more satisfactory results.

A few people object to the practice of exposing utensils on an outdoor rack on the score that dust may blow into them and thus contaminate the milk. While dust, with the bacteria carried by it has no place in milk, yet it would be less harmful than the enormous numbers of bacteria which develop in a moist can. If, however, there is serious trouble due to dust entering the utensils, this may be overcome by rinsing them with either boiling water or chlorine rinse *immediately before use*. The latter is particularly convenient, as it can be made up in a moment. Care should be taken to drain the utensils well, to avoid any chlorine taint and smell appearing in the milk.

DEVELOPING THE DAIRYING INDUSTRY.

Intensive rotational grazing, conservation of fodder, improvements in type of cattle, and reduction of disease were among the avenues of progress suggested by Professor A. E. Richardson (chairman) when the dairying investigation committee appointed by the Federal Government met in Melbourne recently. The effect of the present systems of land tenure, he said, should be investigated to determine how far they prevented dairy farmers from following progressive policies. The terms of reference to the investigating committee are—

- To formulate plans for improving efficiency, increasing productivity, and diminishing costs.
- To devise means for enlarging the scope of the £31,000,000 agreement for the purposes outlined by the British Economic Mission.
- To determine the prospects of extending the industry in suitable areas in Australia.

Professor Richardson (South Australia) explained that the main task of the committee was to conduct a survey of the dairy industry in Australia, and in the light of evidence available to formulate plans for its improvement. The committee would be relieved of the details by the staff of the Development and Migration Commission. Its methods of working therefore would be to review the evidence collected by the officers.

An Australian Staple Industry.

The dairying industry was one of the three staple industries of the Commonwealth. It involved an annual production of approximately £30,000,000 a year. The present position of the primary producers had been affected by the fall in the price of exported produce and the severe competition owing to expansion of production in other countries. If the industry was to expand, it would do so only by obtaining a higher value for dairy products, which, in itself, would stimulate increased production; and by cheaper costs, which would enable Australia to compete on more favourable terms with producers abroad.

The British market fixed the world's value for butter and cheese and leading items of export. The recent expansion in dairying in other countries, notably Denmark, the Baltic States, Siberia, and the Argentine, had forced Australia to meet with increased competition and lower prices in the London market. There was little hope at present of inducing Britain to change her trade policy, though increasing support was developing for preferential duties on Empire grown products.

The Overseas Market.

At the moment there was no other market available that was capable of absorbing Australia's production for export, and there was no immediate possibility of obtaining higher values than could be given by the London market.

There was little question that greatly increased production per cow and per farm could be effected if only the many would do what the few were doing—exploit the possibilities of their pastures, adopt rational feeding of cattle, and conservation of surplus fodder, systematically improve the producing power of herds by the use of better bulls, by systematic herd testing, and by better methods of farm management. In no other country in the world were cows so dependable on the quantity and quality of the grass as in Australia.

A calculation that he had made on the basis of the stock slaughtered and stock products exported from Victoria showed that, during the last sixty years from Victoria alone, the equivalent of 2,000,000 tons of superphosphates had been removed from pastoral lands through the grazing of stock and the export of stock products. Probably not more than 10 per cent. of this amount had ever been returned to the lands.

Improved Pastures mean Greater Stock-carrying Capacity.

Judging from results obtained in widely scattered areas in Victoria, there was no reasonable doubt that the stock-carrying capacity of the land could be greatly increased at a cost that would give a handsome return on the expenditure. It was reasonably clear that a very material increase in quantity of pastures and in nutritive value might be expected when fertilisers were more generally used. This would be reflected in increased stock-carrying capacity of milk and butter-fat per cow. More cows might be kept better fed on a smaller area.

He emphasised the value of pasture top dressing and the growth of better types of pastures as fundamental. Another phase was intensive grazing. Young grass was richer in minerals and protein than mature grass. In fact, young dried grass approximated the feeding value of the best concentrates. To obtain the highest production of nutriment from grass, the pastures must be kept short by intensive rotational grazing in relatively small paddocks, instead of allowing stock to wander at large. Whether such intensive methods of grazing were adopted to the best dairying areas in Australia would have to be determined.

Herd Improvement—Fodder Conservation.

He dwelt on the need for the conservation of fodder and improvements in the type of dairy cattle. Two avenues were available—the use of high-grade bulls and the extension of herd testing. Both the Federal and State Governments were financially interested in the improvement of cattle through herd testing. Another important factor was the reduction of disease in dairy herds.

One other matter was that of land tenure. The effect of present systems should be investigated to determine how far they prevented dairy farmers from following progressive policies. In factories there seemed to be two possibilities—to reduce overhead expenses by regrouping and amalgamation, and to improve the quality of the product by improved supervision and the extension of technical knowledge among factory operators.

At present the world's parity for dairy products was too low to enable many of the dairy farmers to finance such reforms without external assistance.

A general discussion followed on preliminary subjects before the committee adjourned.

BUTTER-FAT VARIATION—COWS WITH TIGHT UDDERS.

Why does butter-fat vary in proportion so widely in the same cows? The question has interested many scientific research workers, as well as practical dairy farmers. Among the latest attempts to find some relation between fat content and ordinary working conditions is that of Mr. S. Bartlett, of the National Institute for Research in Dairying, Reading, England, who has made an analysis of the yields of the dairy herd owned by the institute. That herd, comprising Shorthorns and Guernseys, has been individually tested for butter-fat at each milking on three consecutive days in each week since 1922, and has provided 111 complete lactation records for analysis.

The intervals between the milkings throughout the five years have been fifteen and one-quarter hours at night and eight and three-quarter hours in the day, and the conditions, both of feeding and management, were those common to cows in the south of England. Milk secretion is at a slightly lower rate during the longer interval between the milkings; with regard to fat production, in early lactation the weights of fat yielded at the morning and evening milkings were practically the same, but as the lactation progressed the difference between morning and evening yields became more pronounced. From the fourth to the eighth month of lactation, the evening milk contained about 1 per cent. more fat than the morning milk, whereas during the first three months of lactation the morning milk appears to be subject to a still greater depression in butter-fat percentage.

It was found that first calvers in early lactation produce approximately the same, or even a greater weight of fat at the evening milking than they do at the morning milking, and this condition gradually disappears with the advance of lactation. Second calvers produced a little more fat at the morning milking, and in the case of older cows the morning fat yield is proportionately greater; in all-age groups, however, the proportional yield of fat at the morning milking is found to be greater in the later stages of lactation.

Another discovery was that cows with high udder pressure—those with very tight udders—yielded a lower weight of fat at the morning than the evening milking. From this Mr. Bartlett infers that not only does excessive pressure in the udder cause a decrease in secretion, but also induces reabsorption of part of the milk. It is of interest to find apparent reabsorption occurring under ordinary farm conditions.

The small seasonal variations in butter-fat percentage support most of the experimental evidence so far published, showing that foods do not affect the percentage of fat in milk to any appreciable extent, unless those foods upset the health of digestion of the cows. Poor-quality milk during the early spring months may be due to the young grass stimulating milk rather than fat production.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING APRIL, 1929 AND 1928, FOR COMPARISON.

| Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | | Divisions and Stations. | AVERAGE RAINFALL. | | TOTAL RAINFALL. | |
|-------------------------|-------------------|------------------------|-----------------|--------------|----------------------------------|-------------------|------------------------|-----------------|--------------|
| | April. | No. of Years' Records. | April, 1929. | April, 1928. | | April. | No. of Years' Records. | April, 1929. | April, 1928. |
| <i>North Coast.</i> | | | | | <i>South Coast—continued:</i> | | | | |
| Atherton ... | In. 4.37 | 27 | In. 5.52 | In. 1.26 | Nambour ... | In. 5.36 | 32 | In. 19.42 | In. 21.78 |
| Cairns ... | 12.09 | 46 | 3.78 | 2.48 | Nanango ... | 1.77 | 46 | 2.77 | 6.24 |
| Cardwell ... | 9.39 | 56 | 2.37 | 2.31 | Rockhampton ... | 2.23 | 41 | 8.98 | 21.68 |
| Cooktown ... | 9.09 | 52 | 6.53 | 1.63 | Woodford ... | 4.10 | 41 | 8.84 | 19.16 |
| Herberton ... | 4.10 | 41 | 0.99 | 0.63 | | | | | |
| Ingham ... | 8.38 | 36 | 5.10 | 2.93 | <i>Darling Downs.</i> | | | | |
| Innisfail ... | 21.06 | 47 | 4.32 | 5.90 | Dalby ... | 1.22 | 58 | 2.96 | 5.02 |
| Mossman ... | 9.77 | 15 | 4.29 | 2.48 | Emu Vale ... | 1.14 | 32 | 2.31 | 4.16 |
| Townsville ... | 3.62 | 57 | 2.50 | 0.16 | Jimbour ... | 1.21 | 40 | 2.24 | 4.30 |
| <i>Central Coast.</i> | | | | | Miles ... | 1.28 | 43 | 4.59 | 4.59 |
| Ayr ... | 2.65 | 41 | 6.23 | 0.19 | Stanthorpe ... | 1.61 | 55 | 3.80 | 3.12 |
| Bowen ... | 2.78 | 57 | 10.08 | 1.19 | Toowoomba ... | 2.37 | 56 | 4.96 | 9.58 |
| Charlton Towers ... | 1.65 | 46 | 2.17 | 0.20 | Warwick ... | 1.57 | 63 | 3.53 | 4.70 |
| Mackay ... | 6.48 | 57 | 14.10 | 6.84 | | | | | |
| Proserpine ... | 6.02 | 25 | 12.20 | 5.91 | <i>Maranoa.</i> | | | | |
| St. Lawrence ... | 2.71 | 57 | 9.55 | 11.93 | Roma ... | 1.20 | 54 | 5.84 | 3.93 |
| <i>South Coast.</i> | | | | | | | | | |
| Biggenden ... | 1.83 | 29 | 9.05 | 5.68 | <i>State Farms, &c.</i> | | | | |
| Bundaberg ... | 2.85 | 45 | 7.25 | 13.54 | Bungewongorai ... | 0.72 | 14 | 6.42 | 3.91 |
| Brisbane ... | 3.77 | 78 | 9.84 | 14.89 | Gatton College ... | 1.53 | 29 | 4.37 | 6.94 |
| Caboolture ... | 3.90 | 41 | 10.25 | 17.61 | Gindie ... | 1.06 | 29 | 2.05 | 6.05 |
| Childers ... | 2.54 | 33 | 7.65 | 9.76 | Hermitage ... | 1.15 | 22 | 3.44 | 4.00 |
| Orohamhurst ... | 5.78 | 35 | 16.66 | 27.04 | Kairi ... | 4.74 | 14 | 0.90 | 1.20 |
| Esk ... | 2.59 | 41 | 8.27 | 16.69 | Sugar Experiment Station, Mackay | 4.93 | 31 | 15.45 | 5.07 |
| Gayndah ... | 1.33 | 57 | 5.23 | 2.42 | Warren ... | 1.31 | 14 | ... | ... |
| Gympie ... | 3.14 | 58 | 9.92 | 14.17 | | | | | |
| Kilkivan ... | 2.01 | 49 | 8.41 | 7.13 | | | | | |
| Maryborough ... | 3.14 | 56 | 12.75 | 13.34 | | | | | |

GEORGE G. BOND,
Divisional Meteorologist.

16th May, 1929.

Readers are reminded that a cross in the prescribed square on the first page of this "Journal" is an indication that their Subscription—one shilling—for the current year is now due. The "Journal" is free to farmers and the shilling is merely to cover the cost of postage for twelve months. If your copy is marked with a cross please renew your registration now. Fill in the order form on another page of this issue and mail it immediately, with postage stamps or postal note for one shilling, to the Under Secretary, Department of Agriculture and Stock, Brisbane.

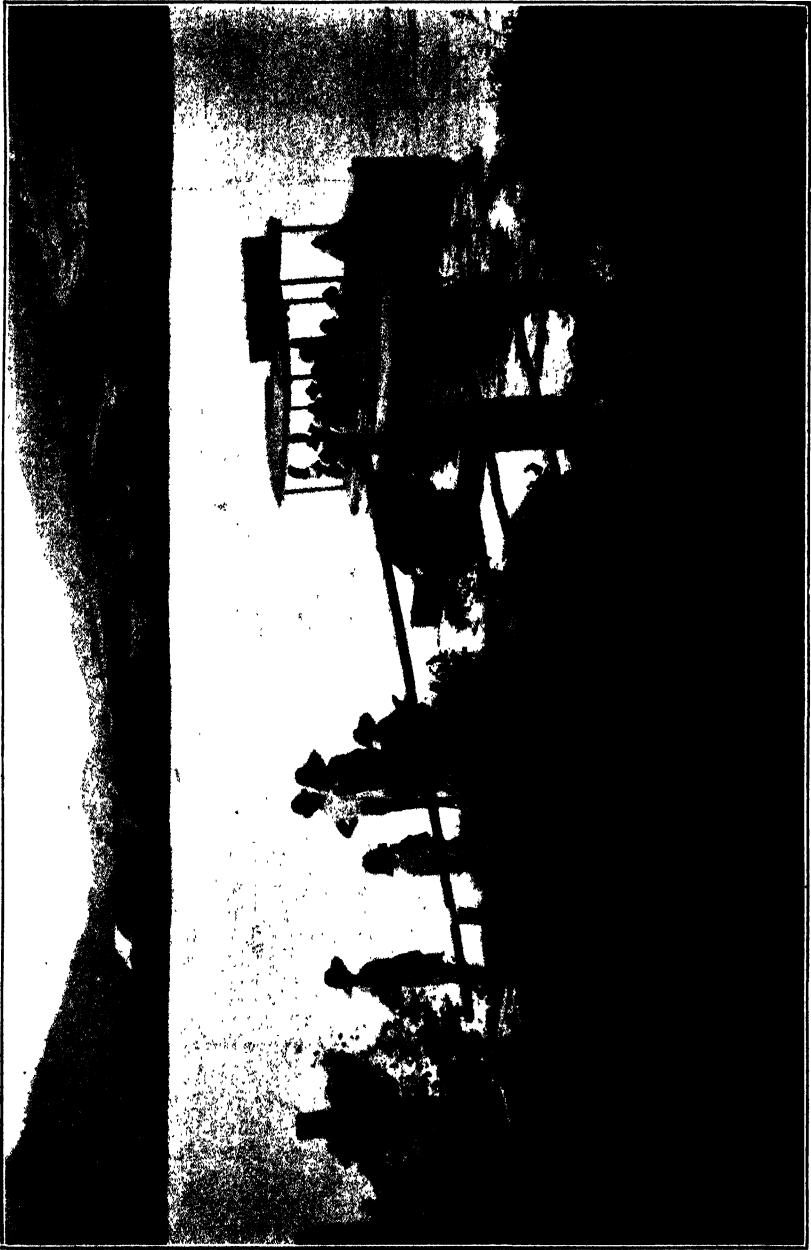


Photo.: Dept. of Public Instruction.]

PLATE 114.—MOTOR BOAT CONVEYING FARMERS' CHILDREN TO THE MAROOCHY RIVER STATE SCHOOL.



Photo.: Dept. of Public Instruction.]

PLATE 115.—NATURE STUDY IS AN IMPORTANT SECTION OF THE YOUNG BUSH QUEENSLANDER'S EDUCATION.

Top: A Lesson in forest botany.

Centre: When shadows deepen—A young nature lover's camp on quiet waters in the heart of our beautiful bushland.

Bottom: Was it a platypus or merely a "yabby"?

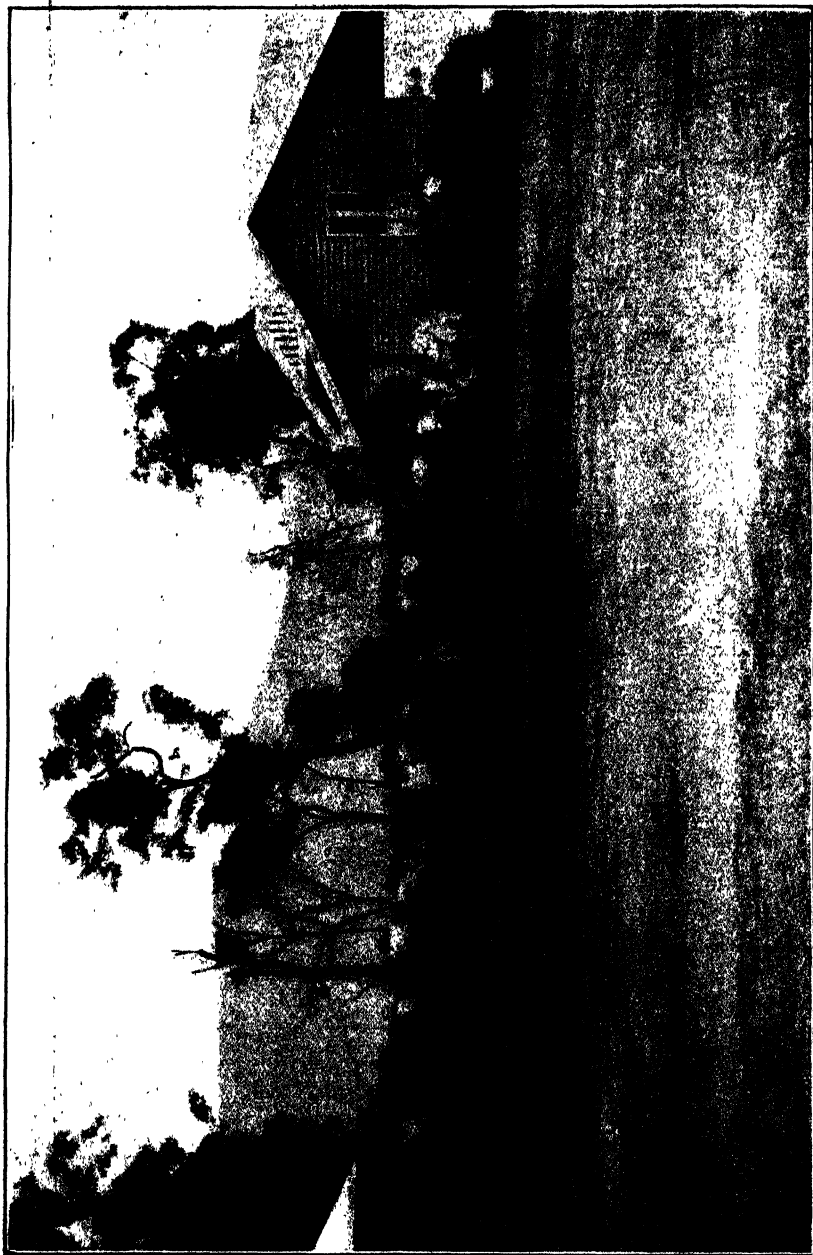


Photo: Dept. of Public Instruction.]
PLATE 116.—SCHOOL'S OUT. SCHOLARS OF STONE SCHOOL, NEAR INGHAM, NORTH QUEENSLAND, READY FOR HOME.

THE CULT OF THE COLT.

By "U9L."

EQUINE JIU-JITSU.

Holds and Grips.

My idea in this article is to give a bit of a dissertation on what, for want of a better name, may be termed equine jiu-jitsu.

A knowledge of this, even in the most elementary sense, is of value in checking fractiousness, and by its employment often much sweat and straining are saved. In spite of a well-known advertisement to the contrary, there's really no need to use force regularly. By utilising natural means as a curb a better effect is achieved, and the horse, be he either an old stager or a colt, recognises that man is a genius against whom 'tis but waste of time to pit his little brains. I've learned none of this out of a book, nor yet have other men taught me one bit of it. It has been garnered by watching horses at play, in love, and during their expressions of hate and fighting, and though I don't claim that the system is even approaching perfection, and there's much to add to it before a man may write himself a master, it's handy to have if for no other means than to amuse yourself.

I've told you previously of the check utilised by gathering the loose skin under the neck and holding that in your clenched fist. Should a horse—particularly a mare—show a reluctance to back you may employ that to achieve your purpose. With that loose skin in your hand, and pressing slightly in the direction in which you wish her to go, you may make the mare go in a reverse lead in any direction you wish.

Checking a Kicking Horse.

There's nothing checks a kicking horse's ambition like a strap round the ham-string. A saddle strap is just the thing for this, and frail as it is it'll do all wanted of it. With that in position he can't kick. He may swing his leg and make futile efforts to put a bit of ginger into it. But he can't! Failing a saddle or your own hand may grip that tendon sufficiently to nullify a mighty kick. Yet, if you get the right grip, you may stultify the whole thing by pinching tendon with your finger and thumb. Dangerous? To a certain extent, sir,

You'll often see a man trying to check a horse by putting one arm over its neck and the other hand will be employed to pinch the horse's nostrils. He'll maintain that he isn't pinching. But he is—he can't help doing it with the hold he's got. Instead of dropping that other hand on the nostrils, which only makes the horse fight against you to get his breath, if you take him about three inches higher up, and on the bone of the nose, you have the same leverage, the same command, and the horse isn't inconvenienced by having its attention drawn to other matters—the fight against suffocation, for instance.

There's a needle-fine sinew running up the back of the forelegs which, if gripped with finger and thumb, does much to paralyse that foreleg. Failing that elusive tendon, if you take a handful of the muscle in the same place you'll find, nine times out of ten, that horse will drop on that leg; mares, again, are more susceptible to this influence. A similar result is achieved if you bite with your finger and thumb on the front of the bone a few inches above the knee-joint.

The main nerve-centre—or, rather, the plural of that—is just in front of the wither and just behind it. Watch two stallions fighting. Failing that, watch a stallion making advances to a cat-tempered shrew. He knows where to go and what to do to nullify retaliatory measures. If a horse won't stand, and if your hand is strong enough, take a grip of his wither pretty low down and squeeze. It's well to have a bridle on when you do this, and to hold short on the near

*In the "Pastoral Review" for May, 1929, previous notes on this subject by the same interesting and well-informed writer were reprinted in the March, August, October (1928), January, February, March, April, and May (1929) Journals from the February, April, May, July, September, October, December (1928), January, and February (1929) numbers of the "Pastoral Review."

rein with the left hand while you squeeze with the right. If you're not as strong as you think you are the horse will bound forward. But if you have the strength which should be yours you'll see that horse stand stock still and quiver. It will flinch a bit and stand motionless and without the power to move.

A Fool Trick.

This is a fool trick, but it at least shows what sort of a nerve centre is in front of the wither. Mount your horse, take a handful of his mane about 9 in. back from his ears, and pull up with that with all your strength. Press the other hand on the back of his neck just in front of the wither and exert yourself in an effort to squeeze down. Now urge the horse forward. In less than a dozen strides that horse will stumble to his knees, and unless you release your grip lively he will roll right over quite helpless.

How many times have you seen a man holding a horse's foot up and have his hand placed under that horse's fetlock? You'll see it nine times out of ten. That suits the horse right down to the ground. He's got a sling in which to rest his weight, and he has the full use and power of that limb. Take him by the point of the toe of the hoof, and double that fetlock joint. In that position, and particularly with that joint bent, the horse is helpless in that leg and he can't put an ounce of weight on you. He can swing it mildly; but he can't make use of it. The same thing applies both fore and aft. If you double that hind fetlock then the leg is yours. Of course, the horse has three other legs which it may utilise; but the one you've got is yours till you let it go. We've all seen a colt thrown and men essaying to put a loin-rope on it. They'll strain and heave to double those hind legs at the hocks, and mighty are the exertions on both parts—the colt's and the men's. And yet did they but catch the hoof in their hand, double the fetlock joint over and hold it in that position, the hind leg could be folded up and crumpled like a sheet of wet tissue paper!

The flank's another nerve centre. With any sex, though particularly with mares, a grip of the flank makes you the master. Take a short hold of the rein before trying this also. When you've got that grip, and when you're standing in close—as you should be doing all the time—take a handful of flank and grip tight. The horse will flinch, it may even try and bound forward—the short grip of the rein and the fact of being in against it protects you—and it will then stand with one limp hind leg. That's the one of which you have the flank. Take a good hold of that muscle and the horse knows you've got him where you want him.

Another "Button" to Press.

The stifle, which corresponds to a human knee-joint, is another button you press to bring the light of understanding to a mare. Take that in your hand, gripping with your fingers like the teeth of a stallion's mouth, and note her lean over in helplessness towards you. If you've got a short hold of the rein, and if you lift your right foot then and hook the toes of it round her hamstring, and pull with that foot, you'll find the mare will come right over till she overbalances and then she sits down like a begging dog. Her forelegs will be stretched out in front of her, and if you snap with your fingers at the muscles there she'll double that leg to pull it under her. As soon as she does she'll roll over on her side and, if you're smart enough, you whip her tail between her hind legs, up through her flank, and she's yours till you like to let her up again. That takes doing; but it can be done.

The Tail Hold.

Should you not be as smart as you might be, and if the thing struggles up after you've drawn her tail through her flank, there's no need to despair. She's yours again if you're able and willing. Keep hold of that tail, and as she rises to her feet hang on one side of her with your knees pressed against her ribs. She'll stagger along with a dot-and-carry-one action, and when she notes you there, and makes a guess at what you're trying to do, she'll make an effort to bound. She can't. But she'll try. That is your chance. When the thing's partly in the air, and off her balance, using that tail as a lever, and your knees as a fulcrum, throw yourself backwards. The mare will flop heavily on her side and you'll land on your feet beside her. Then, if you've done it right, you can repeat from where you left off last time.

Another nerve centre is a fine sinew running up the back of a mare's buttocks. It's only a little thing, and you may take it easily between your finger and thumb.

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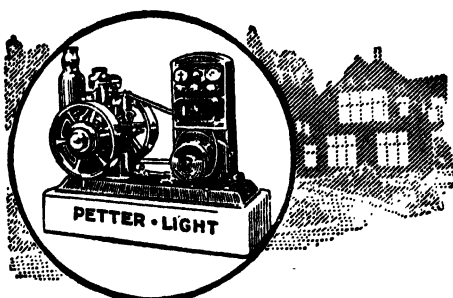
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If you locate it, and if you pinch it, the mare will do one of several things according to the state of ticklishness which is hers. If she's not very thin-skinned she may ignore it almost, and if she is susceptible to the influence then she'll run back and sit down as though she's been standing on a pat of melting butter.

If a horse won't stand, and you wish to perform any operation while he's standing on his feet, a hold of his tail is a steadier. Get this—it applies equally to mares—and bend it straight back along his spine. Use force in this and press that tail back till its joints are cracking. That horse will spread its four feet wide, it'll extend its head in its helplessness, and it stands like a graven statue of immobility. Do what you will, that horse can't offer any resistance worthy of the name till you've released that strain. It has no after effects, and it's quite safe to use.

Throwing a Foal Without Ropes.

Without ropes you throw a foal by catching him first. To do this you throw your right arm over his neck and curb his bounds by pressing with your buttocks against his chest and propping your own legs straight out in front of you. That's easy and you check his ambitions in no time at all. Moving fairly lively and never giving the foal time to get set and read your intentions, you swing round, keeping your right hand on his neck just in front of the wither, and with your left hand you knock his muzzle over your right biceps—there or thereabouts. Now you press down with a steady strain with your right hand and lever the thing's muzzle up with your biceps at the same time. While you're doing this you make a half-turn to the left, swinging the foal with you, and he goes down on his buttocks and rolls on to his side without any trouble at all. We never used a rope on any foals under about ten months. And we dealt with some sturdy jokers, too! The more a foal struggles and attempts to bound in this exercise the easier he is. It's the fellow who won't move, who stands with widespread legs and ignores your efforts, who stays put and defies all attempts to throw him.

Those are just a few holds and grips, being a very brief outline of what can be done with a little judgment and a fair share of activity. I tell you they can be done, but don't forget the first essential in all things—get in and stay in close. If you do that you have a chance of finishing your job in the round yard; if you neglect it you'll finish in the hospital.



Photo.: Jean Easton.]

PLATE 117.

Minto Crag and its Parent Range forms a Protecting Background to Coochin's Rich Agricultural Lands.

POINTS FOR MOTORISTS.

DECARBONISING "DIRTY" ENGINES.

"How often do you have to decarbonise?" is the question that invariably crops up when two or three car owners are comparing notes. The fact that this query is so often raised is in itself sufficient to show that the distance that engines can run between carbonisation varies considerably. This, perhaps, is only to be expected where engines of different design and make are considered, but it usually comes as a distinct surprise to an owner to learn that a car which is identical with his own has to be decarbonised at very different intervals. It is a fact that, whilst some owners of a popular make of car decarbonise every 1,500 miles, others are able to cover a mileage of 6,000 without removing the cylinder head. This discrepancy can in some measure be accounted for by the varying mechanical sensitiveness of different drivers, for it is well known that some owners are quite content so long as the car runs passably and does not give any trouble, whilst the least falling-off in power is a matter of grave concern to others.

The formation of carbon in an engine cannot, admittedly, be prevented altogether, but the rate at which it accumulates is certainly not beyond the control of the driver. Analysis of the deposit found on a cylinder head and piston crown has shown that it has two main constituents; the first is the element carbon, produced by lubricating oil that has burnt and by the combustion of petrol; the other is of a mineral nature and is the result of road grit finding its way through the carburetter.

The Composition of Engine Oil.

Before going into the question of reducing the carbon formed by oil, it will be well to consider briefly the composition of engine oil. There are three main classes—first, those oils that are composed entirely of hydrocarbons (a combination of hydrogen and carbon), and these are by far the most used in ordinary touring engines. Then come pure vegetable oils, which are usually a combination of hydrogen, carbon, and oxygen, whilst in the third class are those oils that are formed by a combination of hydrocarbon (or mineral) and vegetable oils.

No matter what its composition, however, engine oil tends to become thinner or lose body when it becomes hot, and at very high temperatures it will decompose. In the case of vegetable lubricants, the decomposition may first result in the formation of acids, which cause the oil to become rancid, but in the case of a hydrocarbon oil intense heat will result in the oil "cracking"—that is, splitting up into simpler hydrocarbons, such as petrol and kerosene, with the formation of pure carbon. Apart from the loss of its value as a lubricant, an oil that has "cracked" will obviously result in an engine carbonising quickly.

Pure hydrocarbon oils, however, will stand very high temperatures without cracking, although, of course, they will become thinner. "Straight run" oils—that is, those that distil completely over a limited range of temperature—cause less carbon formation than those that are composed of light and heavy fractions mixed to obtain a suitable viscosity. This is because the lighter constituent will volatilise and burn at a lower temperature than the heavier fractions, thus leaving a viscous constituent that cracks under prolonged exposure to heat.

Many good oils contain small proportions of vegetable fats, which improve their lubricating value considerably, provided that these fatty oils are not present in large quantities. They will not affect the rate of carbon formation owing to their high flash-point—the temperature at which they will give off an inflammable vapour and burn—but except for racing, where their property for resisting heat is valuable, oils containing a large proportion of vegetable fats should not be used.

"Cheap" Oils Dear at Any Price.

From these remarks on the combustion of lubricating oils, it is obvious that great care has to be taken in producing them, and this accounts for the comparatively high prices charged for good-quality engine lubricants. It also emphasises the futility of buying cheap oils in the belief that money is thus saved.

It is always wise to follow the engine manufacturers' recommendations, for by doing so the owner is sure not only of getting an oil of good quality but also one that is suitable for his engine. It is quite obvious that a lubricant that is too thin, for instance, will not be satisfactory, because, to give only one reason, there is far more likelihood of it finding its way past the piston rings into the combustion chamber, where, of course, it will be burnt.

Much can be done to reduce carbon formation by keeping the oil in the sump cool, but this, of course, is more a matter for designers than owners. The base of a sump will sometimes be found to be ribbed, and this is done solely to keep the oil as cool as possible. In racing cars, and one or two high-powered production models of Continental origin, makers have gone so far as to fit a special oil radiator. Although it is, of course, beyond the scope of an owner to go to these, he can at least make sure that his front number plate does not interfere with the draught of air past the sump; if it does, the owner will find it worth while to alter the position of the plate.

Much attention has been directed of late to oil rectifiers; these devices are fitted in the oil-circulating system of an engine and serve to remove any particles of solid carbon contained in the oil and to distil off any petrol that may have become mixed with it. Oil rectifiers, however, serve rather to prolong the life of an engine by ensuring better lubrication and to cut down oil bills owing to a less frequent need for drawing the sump than to reduce carbon formation.

An Important Point.

The great thing to remember is that oil must be kept, so far as possible, out of the combustion chamber, and in this matter much can be done by a private owner. After an engine has been used for a considerable time its oil consumption almost invariably increases, and this is nearly always due to oil finding its way past the piston rings. The call for more frequent decarbonisation follows as a natural result. When an engine is dismantled, therefore, it is false economy not to replace a piston ring that has become worn or has lost its springiness.

Many manufacturers fit a scraper ring, which removes any excess of oil from the cylinder walls and returns it to the crank case. The actual ring itself does not, as a rule, vary from the others, but the lower edge of its groove is bevelled off, and holes are drilled through the piston; thus, as the latter descends, oil is collected by the ring and forced through the holes in the piston back to the crank case.

Where a scraper ring is not fitted and the cylinder walls have worn, rapid carbon formation and high oil consumption can often be checked by bevelling off the lower edge of the bottom-ring groove and drilling holes through the piston, thus causing the ring to act as a scraper.

When reassembling an engine, always be careful that the piston-ring gaps are not in line, for, besides causing poor compression, this will allow oil to creep past. Descending long hills in gear with the throttle closed is another cause of oil being drawn into the combustion chamber, because the vacuum produced by the descending piston tends to suck oil past the rings. Under these conditions an extra air valve is of unquestionable value, for the throttle can be closed and the valve opened, so that air is drawn into the cylinder and a vacuum avoided.

Aluminium pistons, owing to their high coefficient of expansion, naturally have to be allowed a greater clearance in the cylinder than the cast iron type, and it might be thought that this would result in a more frequent need for decarbonising. Admittedly, there is more likelihood of oil finding its way into the combustion chamber, but this disadvantage is offset by the fact that aluminium is a much better conductor of heat than cast iron. The piston, therefore, runs cooler, and there is less likelihood of oil on the piston crown and underneath the head being burnt.

A certain amount of the carbon formed is produced from petrol, and here again an owner can take steps to reduce it. With a perfect mixture of petrol and air the principal products of combustion are carbon dioxide and water, but if the mixture is too rich not enough air will be supplied to oxidise the fuel completely; as a result, soot—or, in other words, carbon—will be produced. For this reason a carburettor should be tuned to give as weak a mixture as possible without loss of power.

Common Mistakes.

Then, again, excessive use of the air strangler when starting up must be avoided, as this produces a very rich mixture, whilst the carburettor should not be flooded before starting the engine unless absolutely necessary, as this has the same result.

Finally, we come to the question of dust and road grit. This is responsible for a considerable percentage of the carbon deposit in an engine. Some power units are worse offenders than others in this respect, for the air intake to the carburettor is so placed that a large amount of dust is sucked in through the air intake. The position of the intake cannot always be varied readily, but the difficulty can be overcome by fitting an air cleaner to any car on which it is not already a part of the standard equipment. A number of proprietary makes which can be fitted to any engine are now on the market, and their value is unquestionable.

THE FARM TRACTOR. METHODS OF AIR FILTERING.

By E. T. BROWN.*

The importance of supplying the engine with clean air, through the medium of the carburetter, has been mentioned previously. It is so serious a matter, however, when dust and dirt are allowed to find their way into the engine parts, that further reference may be made to it. The greater part of the tractor's work is carried out under very adverse conditions. The soil is dry and the movement of the outfit and the attached implement raises a cloud of dust. Some means of filtering the air must be found.

There are a number of methods employed for cleaning the air. One of these is to wash it by passing it through a body of water. In passing through the water the air drops its load of dust, and, at the same time, carries with it a certain amount of moisture. This method, therefore, is an excellent one for those engines that need a little water for cooling the mixture when running on kerosene oil.

In another type of filter the air is conducted through curved channels, from which it issues to strike a large central cone. The air is given a whirling motion, which tends to cause it to deposit all dust in suspension that is heavier than air on the sides of the cone. The separated dust falls down the sides of the cone into a receptacle placed below.

A third form is that in which the air is forced through a compartment containing oily wool or some similar material that is capable of collecting the dust. Still another type of cleaner consists of a cylinder of wire gauze on which felt is stretched. The air strikes the felt on entering, and the air alone passes through, as the dust is repelled by the closely woven felt.

Attention to the Air Cleaner.

It is one thing to fit a satisfactory form of air cleaner; it is quite another to attend to it in a proper manner. Under ordinary cultivation conditions the air contains a tremendous amount of dust. If the cleaner be effective, the accumulation of dust during a few hours' work is enormous. Unless the device be cleared out as occasion demands it cannot fulfil its intended function. A clogged filter means that air will be unable to enter the carburetter, and the engine will be so starved that it will either stop altogether or run very feebly and develop little power.

It is important to see that there is no leak in the connection between the cleaner and the carburetter or between the separate parts of the cleaner itself.

Filters, whether of felt or other material, will not be effective if there be any holes in the filtering agent. The dust will easily find an entry through any holes there may be, even if these are only minute. Some cleaners incorporate a number of moving parts. These develop trouble in time, because the parts wear owing to an accumulation of oil and dust. The float in the water-type cleaner may have holes worn in it, in which case a new float must be fitted. Centrifugal types may become so encrusted with oil and dust that their action may cease entirely. Cleaners with small passages may clog up solid, and other kinds may so increase their vacuum effect, due to the accumulation of dust, that the power of the engine is reduced greatly. Whatever system be employed, the maker's instructions should be followed to the letter.

* In the "Farmer and Settler."

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SELECTING THE BREEDING SOW.

POINTS TO BE OBSERVED.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

There is no more important job associated with the introduction of pig raising on the farm than that of knowing what to do, where to purchase, what price to pay, and how to select the breeding stock. The points to be observed in the selection of the sow (as is also the case in selecting the boar) are the same, whether one sow or 100 sows are being selected; hence a general outline of the method of procedure and of the various points to be looked for will be of value. Mr. Shelton's notes on these matters are the outcome of a lifetime's experience, and should be of particular interest to all those associated with the pig industry.—Ed.

In selecting the breeding sow, the essential points to be looked for are:—

- (1) Knowledge of ancestry and pedigree.
- (2) Healthy and vigorous constitution.
- (3) Maternal instinct.
- (4) Body development.
- (5) Indications of milk production.
- (6) Evenness of type and conformation.
- (7) Breeding value.

HEREDITARY FACTOR.

It is necessary first of all to remember that no matter how good the boar may be or how efficient the system of management, unless the breeding sow is capable of producing, suckling, and rearing satisfactory litters, the business of pig raising will be a failure. The writer has heard breeders say of their sows that money could not buy them; thus indicating the paramount value they place on these animals. Therefore, the first thing is to ascertain whether the sow it is proposed to purchase comes from parents of a prolific, easy feeding, quick maturing strain. As with the boar, it is not possible to determine these qualities by appearance alone. The only reliable guide to inherited qualities is the pedigree with stud records, litter records, and fecundity records (if they are available), together with the assurance of the breeder and of his records.

Breed Records.

In Australia, the interests of breeders of stud pigs are cared for by the Australian Stud Pig Breeders' Society, an organisation having a Federal Council with branch committees in each of the States. In Queensland the office of the society is at 3 Inns of Court, Adelaide street, Brisbane, the secretary being Miss Joan Mackay, from whom all particulars regarding the breeding of any particular animal registered or eligible for registration in the Australian Stud Pig Book may be obtained.

Registration of Records.

This society keeps stud records of all registered animals and of the litters of registered sows, and arranges for official transfers when stock pass from the care of one breeder to another. In this way it is possible for purchasers of purebred pigs to ascertain with a maximum of certainty the breeding records of any particular animal they desire to purchase or inquire about.

Hereditary Influence.

Pedigree and breeding records are of the utmost value and should on no account be overlooked. It is wise to remember, too, that though individual excellence of the animal itself is highly desirable, it really occupies second place in comparison with the quality and production records of the parent stock. Pedigree is simply the permanent record of the breeding of an animal, and is of little value in the

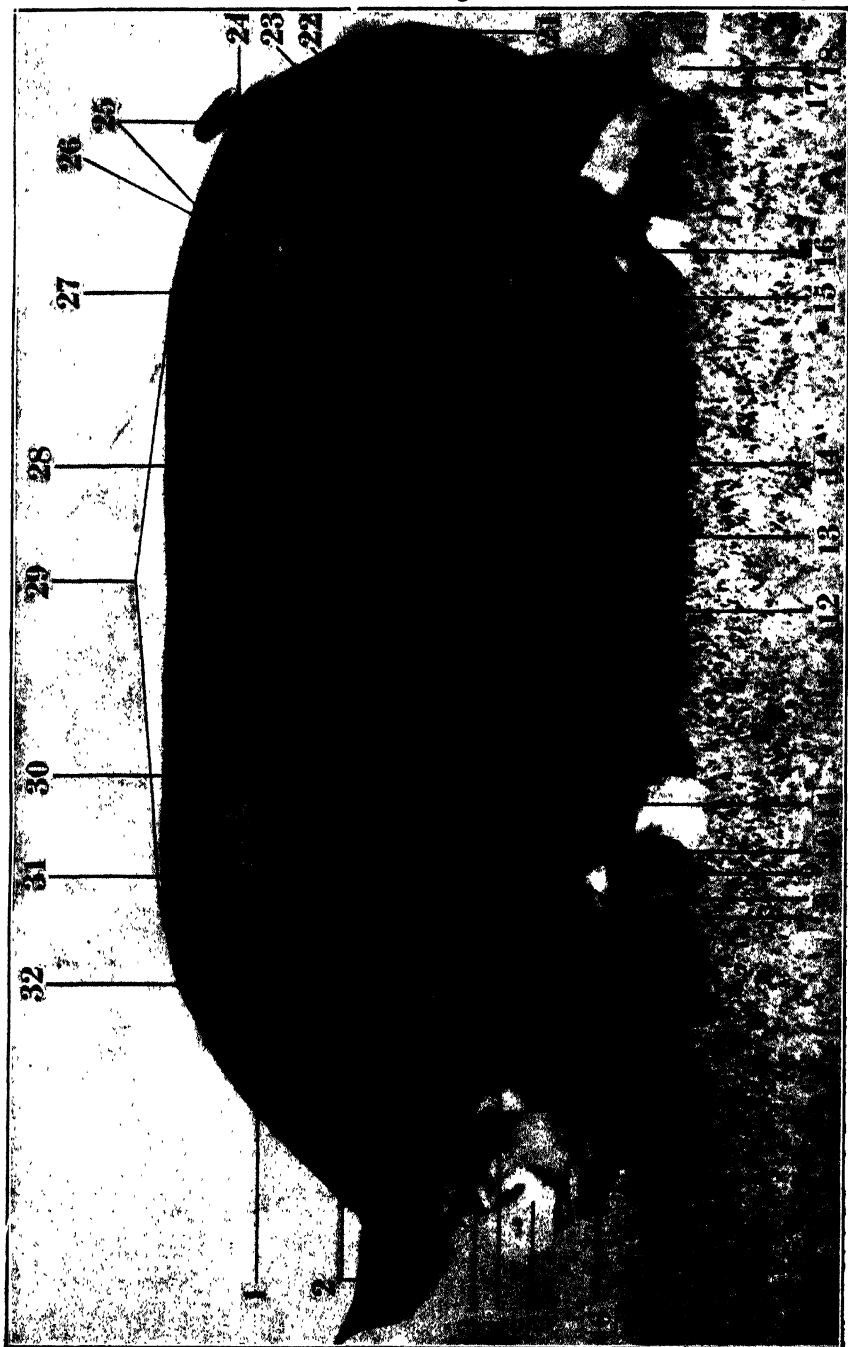


PLATE 118 (Fig. 1).—THE POINTS OF A PIG.

DESCRIPTION OF PLATE 118.

Principal Points of the Pig.

| | | | |
|--|------------------------------|--|----------------------|
| 1. Head. | 9. Chest. | 17. Foot and Hoof. | 25. Rump. |
| 2. Ears. | 10. Knee. | 18. Pastern. | 26. Hindquarter. |
| 3. Eyes. | 11. Forearm. | 19. Dewclaws. | 27. Loin. |
| 4. Face. | 12. Side and Ribs. | 20. Fetlock with Hock Joint close to the figure 21. | 28. Middle Piece. |
| 5. Nose or Snout. | 13. Belly. | 21. Site of Testicles in Males—At top of line above figure 21. | 29. Back. |
| 6. Cheek or Jowl. | 14. Site of Sheath in Males. | 22. Stifle. | 30. Top of Shoulder. |
| 7. Shoulder. | 15. Teats. | 23. Ham. | 31. Forequarter. |
| 8. Shield on Shoulder especially in Males. | 16. Flank. | 24. Tail. | 32. Neck |

absence of records indicating the capacity of the strain to breed true to type, and of the ability of individual representatives to prove profitable by producing stock of equal or superior merit to those produced by the parents.

Other Features.

Even with crossbred or non-pedigree stock it is necessary to study the records indicating such important features as prolificacy, prepotency, early maturity, &c., otherwise one may select as breeding stock the progeny of animals that have produced small and unprofitable litters, even though the individual members of the litters may have been true to type. The capacity to breed freely, regularly, and satisfactorily is certainly hereditary and is transmitted in no uncertain way. A breeding sow selected from a litter of three pigs cannot be relied upon to produce large and satisfactory litters, even though individual animals in such litters may occasionally prove productive.

Constitution.

The innate bodily strength of an animal and the ability to withstand adverse conditions together with the capacity to resist disease is referred to as constitution, and as such represents an extremely important point in brood sow selection. The vigour and health of the animal is dependent upon its constitution, though it is possible to ruin a good constitution by mismanagement and neglect. In the pig a strong vigorous constitution is indicated by a full, broad, deep, capacious chest and roomy heart girth; good width between the eyes, ears, and forelegs; clear bright eyes, and moist snout; soft, silky, mellow skin and hair, and attractive healthy action.

Vigour.

Pigs need to be strong and healthy if they are to prove profitable, and it is important that all the features referred to be sought for in the selection of such animals.

MATERNAL INSTINCT.

To be distinctly effeminate and of a gentle, matronly disposition, withal to be well developed, of good size, and of an attractive type is highly desirable in a breeding sow. Coarse masculine types that run to fat and that lack maternal instinct are quite useless. By maternal instinct is indicated the capacity of the sow to desire to become the mother of numerous progeny and having produced such families to be able to care for and suckle them in true motherly fashion.

BODY DEVELOPMENT.

In the course of one's travels one frequently comes across big, burly, "beefy" sows that look as if they would turn up their noses at the job of suckling litters, these sows being often of a savage, cranky disposition, preferring all the time to fill their stomachs with whatever food there is available, and then to go and sleep off the effects and live a life of ease. This type of sow is a bug-bear to the industry, as also are those small, chubby, pot-bellied types one frequently notices on farms where wild pigs have been kept, and where it is the practice to mate the sows just as soon as they are big enough and are ready to take service.

Size and Conformation.

Breeding sows should be large, roomy, and well proportioned, with wide capacious chest and long deep bodies and hindquarters, otherwise they are unable to allow for the development of large thrifty litters and for their free and easy birth at farrowing time. The capacity to produce and rear numerous progeny must be encouraged by proper development during the early stages of the animal's life, and by its selection from strains noted for these desirable and necessary qualities. This requires that during the growing stages the animal should be encouraged to grow and stretch out in preference to being fattened, and this can only be done by permitting free range over succulent pastures where the animal will have opportunity of picking up not only green food and mineral element, but will have the benefit of sunshine, exercise, and a clean healthy environment. One pities the sows that are kept continuously penned up in small ill-ventilated and insanitary pens and yards. The stock themselves appreciate the provision of roomy paddocks and succulent pastures, and grow and develop to considerably more advantage than is possible under conditions unfavourable to quick growth and maximum bodily development.

INDICATION OF MILK PRODUCTION.

Another feature that should be carefully sought for is the one indicating the ability of the sow to produce a large and continuous flow of milk. Many breeders overlook this most important point and select their stock without any reference at all to the capacity of the dam to milk heavily. In recent years considerable attention has been given to the milk production records of milch cows, and the farmer is now very out of date who does not make careful inquiry into the milk yield of the families from which his dairy cattle are selected. It is a fact that some strains of pigs and some animals are very poor milkers and do not produce sufficient milk to satisfactorily nourish their litters. Other strains are noted for their ability to milk heavily and to suckle freely. It is possible, if records were kept, it would be found that some breeds are heavier milkers than others, and in this connection it is the writer's observation that the Yorkshires and Large Blacks are



PLATE 119 (Fig. 2).—TYPICAL BREEDING SOW OF THE MIDDLE YORKSHIRE BREED.

A sow capable of rearing large, thrifty, early-maturing pigs. Note the remarkable development of udder and teats, indicating the capacity to produce large quantities of rich milk.

She was about two years old when photographed, and won the Reserve Championship at the Melbourne Show.

heavier yielders than other breeds common in Australia, though it is acknowledged that there are many very superior quality females in breeds other than these two of British origin. It is possible, too, that even in these two breeds there may be found "duffers," poor mothers unable to satisfactorily rear litters, but this is certainly the exception and not the general rule. A sow should have at least twelve and preferably fourteen sound, prominent teats evenly placed equidistant along both sides of the belly. Blind, small, or improperly placed teats set too close together are an objection, even though at times small and apparently improperly developed teats may develop to advantage during the suckling period. At any rate, it is

certainly important that consideration should be given to the selection of breeding stock from strains noted for production, and where animals are found to be unproductive they should be immediately culled and disposed of for slaughter to the butcher or bacon curer.

In just the same manner breeding sows that prove their capacity to produce freely, regularly, and abundantly, and that are noted as heavy and continuous milkers should be retained, and stock selected from their litters should be used, even in preference to fresh and unrelated strains about which, possibly, one has but little knowledge.

Keep the Best.

The policy of taking all you can out of an animal and giving back little in return and discarding such an animal after a year or two is not a good business proposition; it is far better to retain strains that have proved themselves and

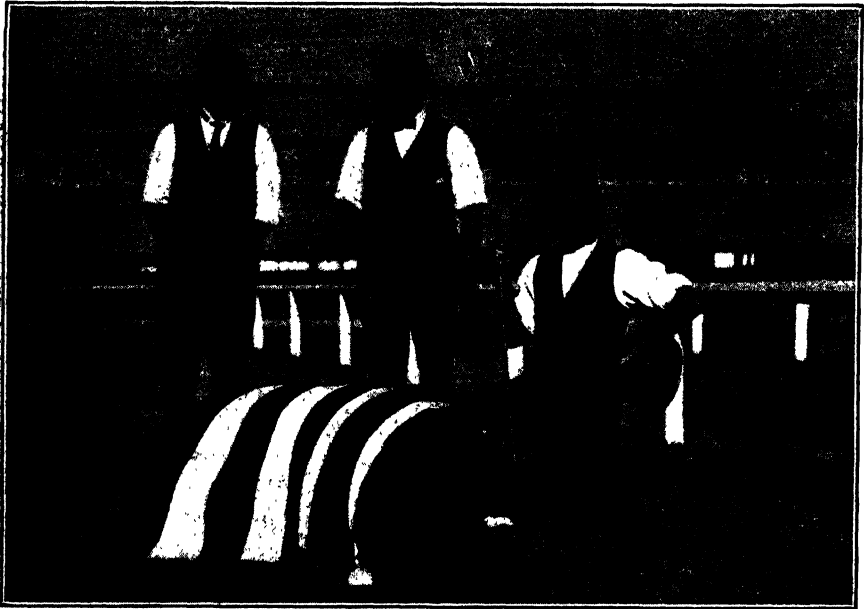


PLATE 120 (Fig. 3).—THE EX-CHAMPION OF CHAMPIONS.

A unique photograph of that famous sow, "Brentwood Dorothy," now deceased. She realised at public auction at the Sydney Show Stud Pig Sales, six years ago, 130 guineas. This sow was a profit-maker of the highest order, and was just as good as she looks. The purchasers, McPhee Brothers, of the Richmond River District (to the right of the picture), are shown in company with Mr. H. J. J. Honey, another enthusiast in pig breeding and in stud stock.

endeavour to develop these still further. It is also much more profitable, especially seeing there is sometimes some difficulty in securing what one may term really high-class productive and reliable strains.

OTHER POINTS.

Easy feeding, contented, docile strains may be depended upon to transmit these qualities to their progeny, hence in studying economy of production it is wise to remember the more pounds in weight animals can put on in a given time on a given amount of food the greater the margin of profit and the lower the cost. Successful pig raising depends upon the production of more pounds of pork and bacon from the food consumed.

Points to Look For.

The breeding sow should be fairly low set, of good length, good constitution, deep-bodied, strong in the back, broad and deep in the ham, and be symmetrical throughout. She should stand squarely on her feet and legs; her head should be refined, indicating quality and representing the feminine type. A good breeding sow invariably has a neat feminine head.

The neck should be short, fitting smoothly into the shoulders, which should be broad, deep and smooth on top, well fleshed, but free from any sign of coarseness. The back should be long and straight, with no sign of weakness or falling away (sows that have a weak or hollow back rarely produce good pigs); it is an advantage to have the back slightly arched. The evenness of width of the back is also important, as this influences the width of the loin connecting the back to the hams in a strong arched fashion.

The sides should be long, deep, and smooth, and free from wrinkles; the top line and underline straight and even. The rump should be broad and well topped up; the tail set high and on a level with the back; the tail should be curled, as this is an indication of health and vigour. The rump should not fall away or droop. The hams should be wide, deep, and well fleshed down to the hock; the legs straight and strong, with good, strong bone. One very common fault is weakness of the knees and pasterns. The leg bones should be fine and close in texture, not round or porous; the feet comparatively small and not splayed; the flanks should be thick and carry a good proportion of flesh, as the belly of a side of bacon is considerably increased in value if the flesh is thick and firm.

The Teeth, Tongue, and Eyes.

In general, the breeding sow does not develop tusks to the same extent as the boar, though some sows have quite prominent teeth. Attention should be paid in the selection of breeding stock to note that their teeth are in order, though it is a difficult job at any time examining a pig's teeth. Occasionally one notices breeding sows (in particular) with long overshot top or lower jaws, and with the tongue permanently protruding either from the front or side of the mouth.

The writer considers these faults as very serious ones which are decided by hereditary tendencies, and faults that should on no account be overlooked either on the farm or in the show ring. Undershot crooked jaws, bad teeth, a crooked snout, or a snout with a decided hump are all to be avoided.

Similarly, roached or hollow-backed animals with "cow licks" or tufts of hair-turned up or awry on the shoulder back or rump are to be avoided. It is wise also to pay special attention to an inspection of the eyes, for, strange as it may seem, some sows, particularly of the short, fat breeds are quite unable to see. In some cases, individual animals will be noted with no eyes visible at all. On more than one occasion the writer has culled breeding sows on account of blindness, and has been offered stock so affected.

Occasionally this defect develops with age. The matter is sufficiently important to warrant attention. On one occasion the writer was offered (by a very prominent breeder) a really choice sow suitable for show purposes, that on inspection turned out to be a barrow. The vendor (manager of a large piggery) admitted he had always inspected by standing in the passage outside the pen while the pigs were being fed and admiring their broad, even, well-developed backs.

Sows might, of course, be non-breeders without exhibiting any external indication of this very serious defect, though to the experienced eye there is something in the appearance of an animal that acts as a fairly reliable guide, but not an infallible one in cases of this description.

Strength of legs is desirable in the sow as in the boar. It is equally essential to avoid selecting sows showing any indication of umbilical or other forms of hernia (rupture). Some Poland-China sows (in particular) show remarkably heavy development of loose skin in the "twist"—that portion of the hindquarter between and at the back of the legs. In some instances there is an appearance as of a scrotal sac, though this is not usually an indication of hernia or malformation.

Even Temperament.

Never select a nervous, fidgety animal for she will make a poor mother and generally a poor suckler. In order to save more pigs at farrowing time, the sow must have an even temperament. She should be easy to handle and not become irritable when the attendant enters the pen.

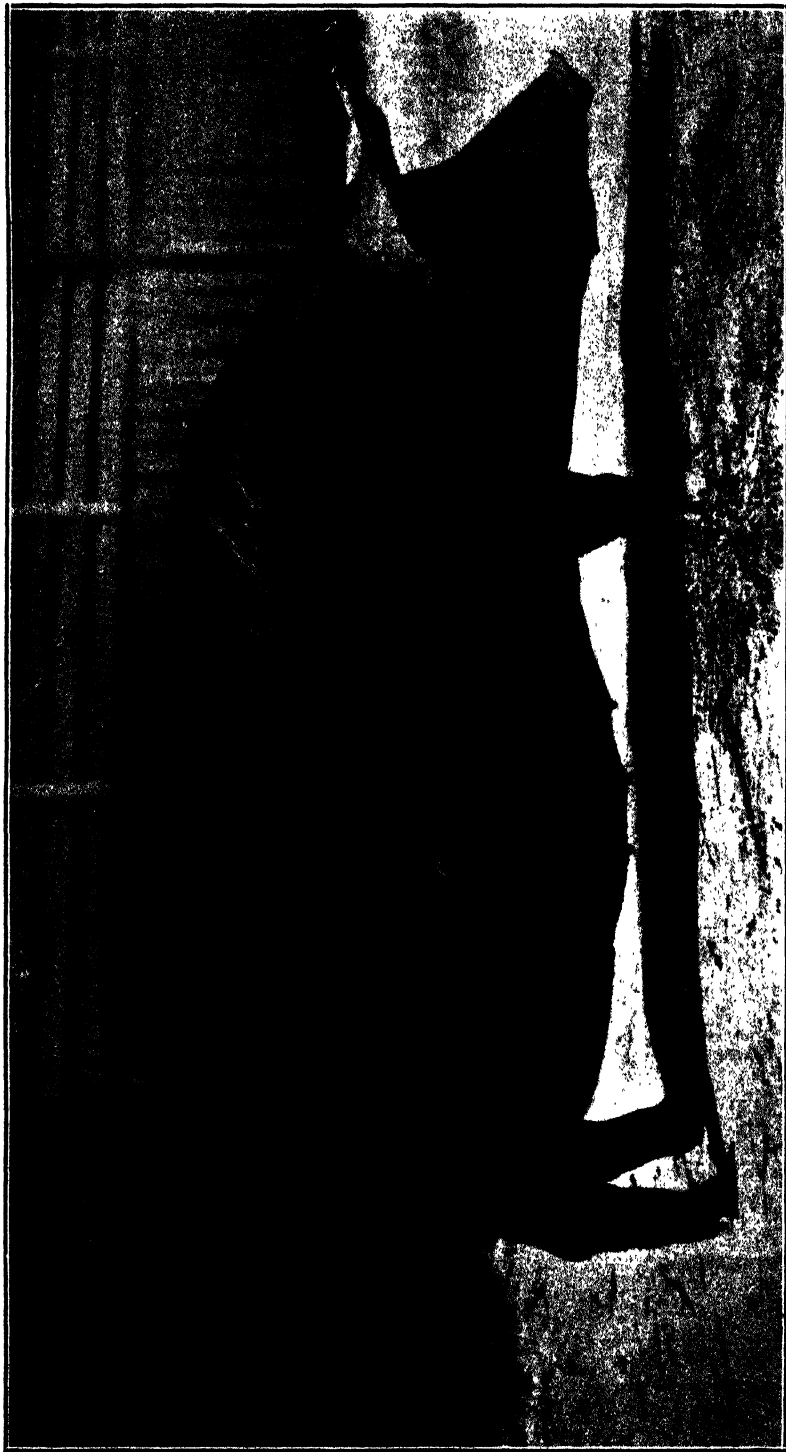


PLATE 121 (Fig. 4).—TYPICAL PRIZE-WINNING TAMWORTH SOW "MANNING ELMORA" (243).

This sow appeals as one of the most typical and up-to-date Tamworths exhibited at Australian Shows. She was a prize-winner at Brisbane Royal National Show. Note her compactness, width, and depth of ham and side and the fine quality hair and skin. An ideal type of breeding sow. She reared many successful litters and is of a type much sought after. She was valued at more than thirty guineas at an early age and produced several hundreds of pounds' worth of stud stock.

Savage, vicious sows (sometimes erroneously referred to as "man eaters") are to be strictly avoided. Care should be taken to avoid classing a sow as a "man eater" if she is suddenly disturbed while sleeping with or suckling a new born litter, especially if disturbed by a stranger whose attention she is unaccustomed to. It is but natural for a sow to protect and care for her progeny (the boar usually sees to this too if he is about) especially while they are very young and unable to care for themselves to the extent that is possible as they grow older.

A good breeding sow is as careful with her babies as is a good matronly hen mothering fifteen to sixteen chicks. Many sows are of a coarse "don't want to breed" type that simply flop down on top of their young ones and smother them one by one till all but one or two of the strongest and most cunning ones remain. Other and better sows take the greatest care possible in rising or lying down in order to give their young ones a chance to escape being crushed. These matronly qualities are certainly inherited and transmittable.

Similarly, good breeding sows of the domesticated race of pigs appear to have enough common sense to know that their owners are watchful and careful and are not out to rob them of their suckers.

Value of Breeding Sows.

It would be well for the beginner, especially if he or she does not know the value of breeding stock, to get in touch with some reliable, and, as it were, disinterested person with a view to enlisting their assistance in these all-important matters. It is first of all necessary to value the animals to be selected in association with the environment under which they have been developed. The very fact that a stud sow or boar (none other than selected animals would be offered unless by special arrangement) was being selected from a stud like, say, Gatton, Hawkesbury, Dookie, or Roseworthy Colleges, or from the studs of other breeders equally as well and favourably known, immediately indicates that it has a value a good deal above that of ordinary "meat" market stock. The reputation of the stud in this case is a guarantee of value, though, of course, unfortunately, no breeder can absolutely guarantee that any one or other of the animals offered or sold will turn out to the seller's or to the buyer's expectation. The health and well-being of an animal is dependent to a very considerable extent upon the health and well-being of other animals in the same stud, and in this way also added value is given to animals selected from reliable healthy studs.

Condition.

The breeding, pedigree records, &c., all add value, for it is but right that a specially selected, registered (or eligible for registration) animal should carry a higher value than common unregistered stock. Again stock that have been properly prepared for sale, have been well advertised, and are in the pink of condition at time of inspection, will command higher values than stock not properly prepared or from studs that do not bother about these things. A good wash and clean-up and bright glossy skin and hair are recognised the world over as additions to the toilet that add considerable value, and that in their own particular way are extremely important items, though one does not want to pay an excessive price for soap, water, and oil, unless the quality and guarantee of breeding are there.

Value is added to any article in accordance with the way in which it is placed before the prospective buyer, and this refers to stock in just the same way as it refers to any other line of merchandise. There are, of course, the "go-getters" in the stock world, just as there are in the commercial world, but, at any rate, value is added to the animal that is correctly described and is placed before the prospective buyer to the best advantage possible. The pen, sty, yard, paddock or other enclosure in which an animal is confined whilst awaiting inspection, adds its quota of value or detracts from same. If the prospective buyer has to wade through mud and slush, inches deep, and has to run the risk of being splattered with mud whilst inspecting the stock, his idea of their value will be on an entirely different plane to that which would be effective if the animal were offered in a clean, cosy, comfortable pen in an environment that indicated that the comfort of the buyer was pre-eminent in the mind of the seller. The purchase of breeding stock that have been awarded prominent and valuable prizes at agricultural shows, and that come from prize-winning strains, well-known, adds a value which is difficult to estimate in pounds, shillings, and pence.

SPECIAL NOTES RE ILLUSTRATIONS.

Figs. 5, 6, 7, 8, emphasise the importance of studying the condition of the breeding sow, for on this depends much of the success in the handling of both sow and her progeny. Many farmers do not allow their sows to develop sufficiently or grow large enough before mating, nor do they allow the sow sufficient nutritious food during her breeding period. Some sows are kept in a very fat and unprofitable condition. The ideal breeding condition is shown in Fig. 4.

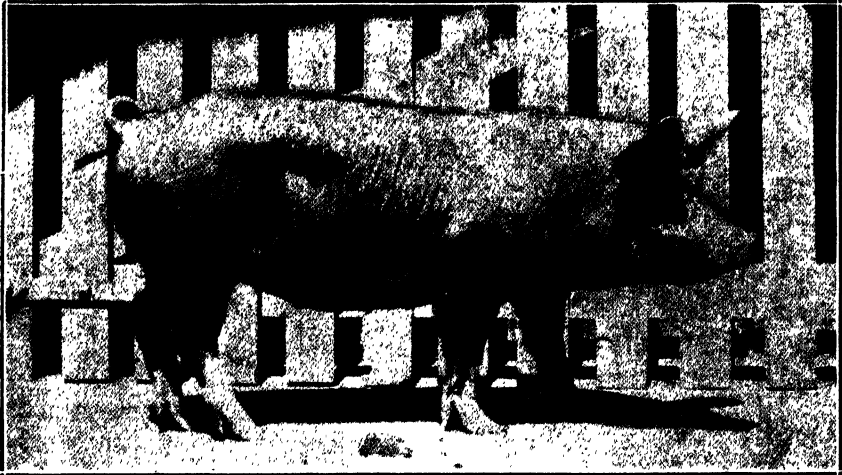


PLATE 122 (Fig. 5).

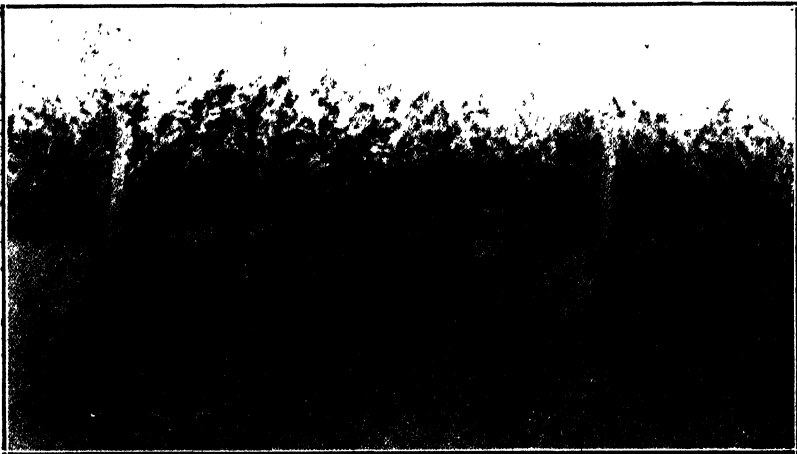


PLATE 123 (Fig. 6).

Figs. 5 and 6 are of farm sows of uncertain breeding too low in condition to prove satisfactory. The young sow in Fig. 5 is too low in condition to mate to the best advantage, while the sows shown in Fig. 6 are too low in condition to rear their young satisfactorily. Sows in such a condition frequently suffer for many months after farrowing, and even if they do not develop paralysis their progeny are more liable to disease and to abnormal troubles than the progeny of sows in medium breeding condition. Sows of the types illustrated should not be retained as breeders as their breeding is doubtful and there are plenty of better type sows available at comparatively low prices.

Selection.

The first pick of a litter or of a special line is, of course, always placed at a higher value than the second, third, or later selection; this is, of course, but natural and is quite in order in the business world. All things considered, then, it is somewhat difficult to indicate just the amount one might have to pay for any particular line of stock offered.

In general, however, it might be taken as a fairly reliable guide under Australian conditions that a good breeding sow is worth not less than three guineas at from two to three months old. This is a low value in the South, where the demand is more permanent, and where the value of stock is better appreciated. "Six guineas each," the Victorian breeder would be inclined to remark if asked the question referred to, and much the same conditions rule in New South Wales. In the other States values of from three to five guineas each at two or three months rule. Boar pigs are usually considered more valuable than sows. Some studs—like Gatton College—have a range of values allowing one guinea more per head for boars than for sows. It is all a matter of arrangement.

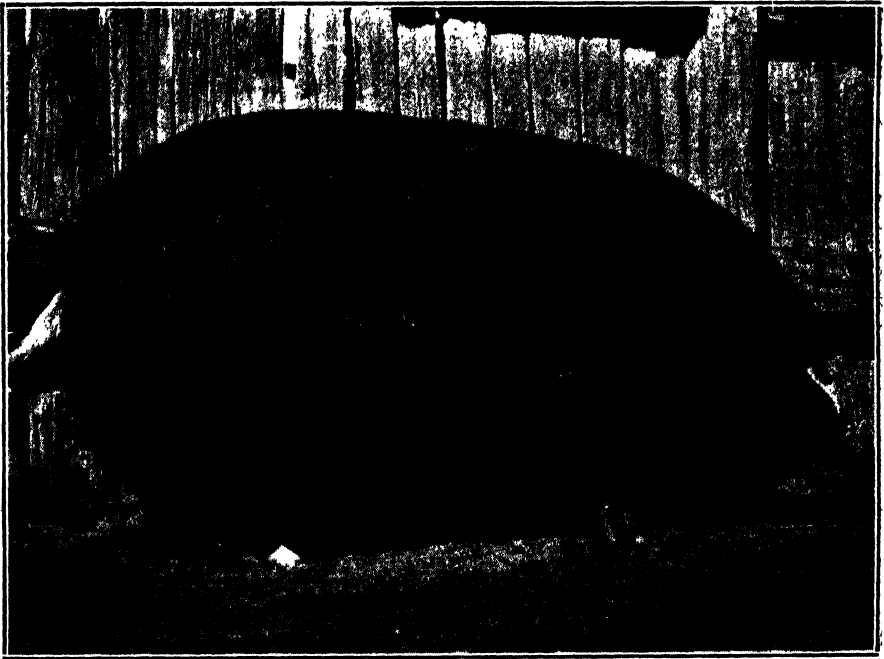


PLATE 124 (Fig. 7).

Fig. 7 is of a Poland-China sow too fat to prove satisfactory as a breeder. She is carrying far too much condition and would be liable to suffer from such troubles as heat apoplexy as well as milk fever. This photograph was taken a few days after this sow arrived from America some years ago. Her condition was in part due to the generosity of the passengers and crew on the steamer who were anxious that the pigs should arrive in the very best of condition. The sow proved a failure as a breeder largely as a result of this overfattening, and had to be sold to the butcher.

Grade Sows.

For ordinary breeding sows (not pedigreed) values must be based on the actual "meat" value of the animal. One cannot expect to purchase selected breeding sows at less than their market value. In fact, a seller is justified in asking a higher value for the pick of the stock available. In the case of ordinary breeding sows, therefore, values may be placed at from three guineas to, say, six guineas at from, say, four to eight months old with lower or higher values according to age. Ordinary breeding sows quoted as "in pig" should be worth ten guineas each upwards if they are of good quality and breeding.

Stud Sows.

Stud sows could be valued at not less than three guineas at two to three months old up to, say, twelve guineas or more as yearlings. Sows quoted as "in pig" are worth more than sows that have not been stunted (mated), though there can be no guarantee that a sow will hold to the service of the male, and no responsibility should be accepted by seller or buyer unless by special arrangement.

Especially selected show sows and prominent prize-winners would, of course, carry a higher value than the above. The same also applies in the case of the boar, and values of from fifteen to fifty guineas might be referred to as reasonable where the quality and reputation of the animal justifies the payment of higher values.

In each case it is a matter of arrangement as to whether the price covers cost of delivery in crate on rail, steamer, or other conveyance, and as to whether crate is to be returned or be paid for. Crates in themselves are worth from twenty to thirty shillings or more each if well made and suited to the job. Rail freights and other expenses must be arranged for, and unless otherwise specified, it can be taken for granted that the buyer takes all risks once the animal is safely delivered at point of despatch.



PLATE 125 (Fig. 8).

Fig. 8 is a prize-winning Gloucester Old Spot sow. At the time this photograph was taken this sow was rearing a large litter of active, vigorous pigs approaching weaning age. She is in ideal condition for a sow at this stage, for it is not to be expected that a sow will hold her condition whilst suckling. This emphasises the necessity of having the sow in proper condition prior to farrowing time in order that she may be able to do justice to her family.

A word in conclusion in regard to the condition of animals at the time of despatch. Nothing is more disgusting to the buyer than when the stock he has purchased arrive at their destination in a dirty, filthy condition, infested with hog lice or other parasites. The seller's reputation is at stake in all these matters; hence every effort should be put forward to ensure safe and satisfactory delivery.

It should be needless to add that in a country like Australia, where distances are great and where means of transport are often comparatively slow, ample notice should be given of the despatch of stock; and when the stock are despatched, especially stud stock, the breeder should see to it that all pedigrees, prize records, and other information are promptly supplied.

Answers to Correspondents.

BOTANY.

Replies selected from the outgoing mail of the Government Botanist, Mr. Cyril White, F.L.S.:—

Swamp Mahogany.

A.H.H. (Byron Bay, N.S.W.)—

Your specimen is *Tristania suaveolens* var. *Glabrescens*, a form of the Swamp Mahogany. The tree is fairly common in Northern New South Wales and coastal Queensland, and is generally regarded as the most important timber for piles in sea water. Your specimens only differ from the normal form in that the leaves are smooth and not hairy, hence the name var. *Glabrescens*.

Gardenia Globosa—"Wedding Bells."

T.B.T. (South Johnstone)—

The flowering tree you call "Wedding Bells" is *Gardenia Globosa*, a small tree that rather likes shady situations in the garden, and bears large white bell-shaped flowers, but we cannot be sure of this, as other trees are known as "Wedding Bells," for instance, *Datura Arborea*, which bears long, pendant, white flowers about 6 inches long. The former is harmless but the latter is poisonous.

Hairy Indigo--Rattlepod.

R.M.F. (Mundubbera)—

The plant with small pods and red flowers is *Indigofera hirsuta* or Hairy Indigo, a very common weed in Queensland, mostly found on waste land, but also fairly common in places of ordinary pasture country. It is not known to be poisonous in any way. Besides Queensland, it has a wide distribution in other countries going from Malaya to India.

The plant with large velvety pods is *Crotalaria juncea*, a species of Rattlepod. Like the other plant it has a wide distribution, and though nothing definite has been proved against it, it belongs to a dangerous genus, which contains other plants, both here and abroad, known to be poisonous to stock.

"Bullock's Heart."

E.F.L. (Calliope, Boyne Valley)—

It is rather hard to name specimens from leaves alone, but we should say there is no doubt your tree is the "Bullock's Heart" (*Anona reticulata*), a plant of the custard apple family (Anonaceae). It is a native of tropical America, but is widely cultivated in the tropical regions of the whole world. It is only occasionally seen in North Queensland gardens. The fruit is sweet, but insipid, and is not to be compared with the common custard apple. This tree is really the common custard apple of most parts of the world, the fruit known in Australia as custard apple being known abroad as sweet sop. We should say that Calliope is altogether too cold for the fruit to set.

Mukia scabrella—"Potato Bush."

W.C. (Biloela)—

The small climber with red berries is *Mukia scabrella*, a plant fairly common in different parts of Queensland, but for which we have not heard a common name. It is a member of the *Cucurbitaceae*, and, though little is known of the properties, some of its allies are very poisonous, particularly the berries, and on this account the plant should be destroyed where it is found growing.

The plant with large green berries is a species of *Solanum* or "Potato bush." This genus is a large one, and the specimens do not allow of specific determination. However, most of the species bearing green berries possess a poisonous property, Solanine. On this account the plants must always be looked upon with suspicion.

Fungus.

P.J.S. (Quilpie)—

Mr. H. A. Longman, Director of the Queensland Museum, has handed us the specimen of a fungus from you. It is a fungus of the Family *Polyporaceæ*, which includes the common Shelf or Bracket Fungi, found on trees and logs. The one you send we should say is *Fomes lucidus*, fairly common in coastal Queensland on dead timber and at the base of trees. It takes many forms, and the finding of the plant so far west is of great interest, and the specimen makes a valuable addition to our Museum collections. Some species of the *Polyporaceæ* are extremely hooflike, and on this account are known as Hoof Fungi.

Flannel Weed.

J.G.G. (Cooroy)—

Your specimen is *Sida cordifolia*, the Flannel Weed, a common weed widely spread throughout the tropics of the world. It is a great pest around some of the towns and townships of North Queensland, and for some years past to a minor extent in Southern Queensland, but in the last season it seems to have spread considerably. It has very little value as a fodder, though quite wholesome; the hairy nature of its leaves and the fibrous nature of its stems making it of very slight value. Regarding eradication, in small areas hand pulling is of course the most effective. In larger areas, cutting off below the surface of the soil, or, where the land is not wanted for some little time, spraying with any of the commercial weed killing preparations should prove successful.

Poison Peach.

J.H. (Miriam Vale)—

- No. 1 is *Trema aspera*, the common Peach Leaf Poison Bush or Poison Peach. The leaves of this shrub at times develop a prussic acid yielding glucoside, and if eaten in quantity then may cause trouble. The plant is also supposed to cause trouble through the indigestible nature of its fibrous twigs, but possibly its dangerous tendencies have been much over-rated, as at times stock eat large quantities of Poison Peach without apparently any ill effects following.
- No. 2 is *Pipturus argenteus*, a shrub or small tree common in coastal Queensland, and not known to be poisonous in any way though closely related to the Poison Peach.
- No. 3 is *Trema orientalis*, a small to medium-sized tree fairly common in coastal Queensland, from Bundaberg northwards. It is related to the common Poison Peach, but is not known to be poisonous in any way.

Sheep Manure as a Fertiliser.

R.W.S. (Woombye)—

Your inquiry regarding the value of sheep manure as a fertiliser was referred to the Agricultural Chemist, Mr. J. C. Brännich, who advises:—"Sheep manure varies enormously in its composition, but is generally of poor fertilising value, only worth about £1 3s. per ton, and would hardly pay for freight and other charges. The results of using such manure have been very disastrous, as it introduces a large number of weeds in pineapple and banana plantations."

PIG RAISING.

Replies selected from the outward mail of the Senior Instructor in Pig Raising, Mr. E. J. Shelton, H.D.A.:—

Production of Good Types.

A.C. (Tolga)—

There is no reason why grain or greenstuff plus mineral matters and water should not be beneficial in producing good type pigs, but it would require some system to keep up a continuous supply of food in your district during the dry spring months. Lucerne hay may be fed to pigs to advantage, but it is sometimes necessary to feed it in a soaked condition at the start to get the animals accustomed to it, particularly breeding sows, and it

is to them specially we advise feeding the more bulky foods. Peanuts are good for very young pigs, but should always be omitted from the rations of fattening pigs.

Pig Ailments.

H. (Clifton)—

Many pigs suffer each year from respiratory troubles (coughs, colds, pneumonia, pleurisy, &c.) as a result of neglect in housing and through being kept in low-lying damp or even wet muddy yards and cold draughty pens, in which there is no bedding and in which dust, dirt, mud, &c., accumulate. Cough in pigs is often an infectious complaint, especially among very young pigs that are not thriving as well as they should. In treating pigs for these complaints it is well to understand that a cure cannot be expected merely from the administration of medicine, in fact it is very risky administering medicine to pigs with affections of the throat and lungs, consequently the objective should be first of all to clean up the pens and yards, provide clean dry accommodation, roomy grazing areas, and good succulent herbage grass, together with an abundant supply of clean drinking water. The next step is to provide a good variety of foods, and balanced rations. It pays to warm the food given to pigs during cold and wet weather, especially to young pigs. The use of cod liver oil in tablespoonful doses daily to each of the pigs that are sickly is recommended, and it would pay you to secure a gallon or two of this oil from wholesale druggists. Provide charcoal and bonemeal, and as an addition we advise the use of small quantities of lime water to the food. This is not an expensive item, and its provision need not necessarily mean much extra labour. It is advisable to isolate all such pigs from the healthy ones, and to give the sickly stock very special attention.

Feeding Pigs.

H.J.T. (Nambour)—

Our experience has been that it does not pay to feed an excess of any particular food whether it be stored or fresh food, or even milk or grain. The best results are obtained when balanced rations are fed, and this can only be attained by a combination of such rations. For instance, maize is a fattening food, it has very little protein or flesh forming value, and pigs fed entirely on maize are liable to develop paralysis and similar diseases and be slow growers. On the other hand, lucerne is a nitrogenous (flesh forming) food, but lucerne will not fatten to anything like the same extent as is the case where lucerne and grain are fed in combination. Ripe bananas are a fattening food, but will only be of use where they are fed in conjunction with flesh-forming foods, such as lucerne, &c. A good water supply and mineral matters like charcoal, bonemeal, &c., are essential, while attention to the accommodation of the animals, and the provision of suitable grazing areas and clean dry sties are equally necessary to the success of any branch of stock raising. This does not indicate that expensive accommodation and a large capital are necessary before one can venture into the business.

The Agricultural Chemist (Mr. J. C. Brünnich) remarks in reply to your other inquiries.

1. A good stock lick for the North Coast District is made up by mixing 33 lb. of coarse salt with 66 lb. of Nauru phosphate (finely crushed). After mixing moisten with a little molasses.
2. Waste bananas should only be fed to pigs when ripe, green bananas would be dangerous. The feeding value would be about the same as sugar beets, swedes, or turnips.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

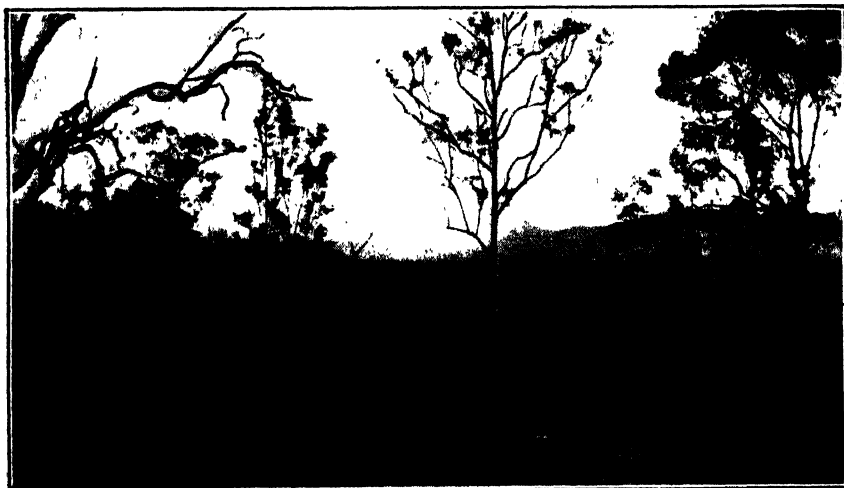


Photo.: Jean Easton.]

PLATE 126.

Evening draws her mantle slowly o'er a prosperous land.



Photo.: Jean Easton.]

PLATE 127.

Coochin Coochin, one of Queensland's historic Station Homesteads.

General Notes.

The Royal Society of Queensland.

The Ordinary Monthly Meeting was held in the Geology Lecture Theatre on 29th April, 1929.

The President, Professor J. P. Lowson, was in the chair, and about thirty members were present.

Miss D. Hill, B.Sc., Miss N. Holdsworth, and Mr. L. F. Mandelson, B.Sc., Agr., were nominated for ordinary membership.

Dr. F. W. Whitehouse exhibited the following fossils:—(1) Flowers of *Williamsonia*, associated with the fronds of *Ptilophyllum*, from the Jurassic deposits (Walloon series) of Bymount, north of Roma; (2) Specimens of a new species of *Calceola* from the Devonian beds of Ukalunda, North Queensland (collected by Mr. J. H. Reid); (3) *Stringocephalus* sp. from the Devonian limestone of Calcium, North Queensland. *Calceola* and *Stringocephalus*, index genera of the Eifelian and Givetian, respectively, of Europe are thus recorded for the first time from Australia.

Dr. W. H. Bryan exhibited some rather rare rocks from Milford Sound, New Zealand, which had been presented to the University of Queensland by Dr. P. Marshall. The rocks comprised Harzburgite (Saxonite), Dunite, Enstatite, and a perfectly white olivine-carbonate rock. Specimens of Dunite and Harzburgite from the type areas were also shown for purposes of comparison. Mr. D. A. Herbert exhibited (a) *Hydrodictyon reticulatus* from Lake Manchester; (b) *Craterium confusum*, a myxomycete from Woolloowin; (c) *Ustilago violacea*, a smut fungus attacking *Carex pseudocyperus* from Kuraby; and (d) a French bean showing polyembryony. The first three are new records for the State.

Mr. A. K. Denmead exhibited a small fossil identified by Mr. R. A. Keeble as belonging to the family *Diplograptidae*, from Brisbane schists (Middle of Bunya series), of Tweed Heads. The age was considered to be Top of the Ordovician or lowest Silurian.

Mr. J. E. Young exhibited a piece of coral containing a crab-gall produced by the female of *Haplocarcinum marsupialus*.

Mr. C. T. White exhibited specimens of (1) *Ficus Baileyana* Domin, from trees growing in Botanic Gardens, Brisbane. This tree was originally named by F. M. Bailey as *F. macrophylla* Desf. var. *pubescens*, and is related to *F. macrophylla* Desf. on the one hand and to *F. rubiginosa* Desf. on the other, but is distinct from either and seems worthy of specific rank. It is common in cultivation, and specimens are to be found growing in the Botanic Gardens at Brisbane, Sydney, and Adelaide. Both Bailey and Domin record it for the rain-forests of South Queensland, but this, Mr. White thinks, is pure guesswork, as though common in cultivation the plant has not as yet been found in a wild state. Specimens of *F. macrophylla* Desf. and *F. rubiginosa* Desf. were also shown for purposes of comparison; (2) Specimens of a small tree belonging to *Eucalyptus* or allied genus growing on sandy hills at Plunkett. The exact botanical position of this tree is a matter of doubt until flowers have been collected.

Mr. J. B. Henderson exhibited an Analytic Quartz Lamp. This is a mercury vapour lamp so fitted with two Wood's filters that ultra-violet rays are projected horizontally and vertically. The vertical rays fall inside movable black curtains, so that specimens may be examined for fluorescence in daylight. The effect of the ultra-violet rays was shown on various drugs and chemicals, also on papers, minerals, and precious stones.

Mr. C. Morton exhibited specimens of Rutile (red) surrounded by a zone of Ilmenite (black) in rounded as well as roughly crystalline forms up to 2 inches in maximum dimensions. They were obtained from shallow alluvial deposits near the Burrandowan road, about 22 miles west of Kingaroy. The country rock is gneissic granite, in which similar specimens were found to occur as isolated individuals.

Dr. E. Marks exhibited two rocks, a trachyte and a tuffaceous conglomerate found at Upper Brookfield.

Dr. Whitehouse, Dr. Bryan, Dr. Marks, and Messrs. White, Jackson, Massey, Denmead, and Jones commented on the exhibits.

The following officers were elected at the Annual Meeting of the Royal Society:—President: Professor J. P. Lowson, M.A., M.D.; Vice-Presidents: Professor T. Parnell, M.A. (*ex officio*) and Mr. J. B. Henderson, F.I.C.; Hon. Secretary: Mr. F. A. Perkins, B.Sc. Agr.; Hon. Librarian: Mr. W. D. Francis; Hon. Treasurer:

Mr. E. W. Bick; Hon. Editors: Mr. H. A. Longman, F.L.S., C.M.Z.S., and Dr. W. H. Bryan, M.C.; Hon. Auditor: Professor H. J. Priestley, M.A.; Members of Council: Dr. C. D. Gillies, M.B., B.S., M.Sc., Professor R. W. Hawken, B.A., M.E., M. Inst. C.E., Mr. D. A. Herbert, M.Sc., Dr. T. G. H. Jones, A.A.C.I., Mr. R. Veitch, B.Sc.

Mr. W. G. Wells was nominated for ordinary membership and Mr. C. Schindler for associate membership.

Professor J. P. Lowson was inducted to the position of President for 1929. Professor T. Parnell delivered his Presidential Address entitled "Modern Developments of Physical Science." On the motion of Professor R. W. Hawken, seconded by Mr. J. B. Henderson, a vote of thanks was accorded the retiring president for his address. A paper by Dr. T. G. H. Jones and Mr. F. B. Smith, B.Sc., on "The Volatile Oil of Queensland Sandalwood" was laid on the table. Mr. H. A. Longman expressed the Society's appreciation of the presence of His Excellency the Governor.

Staff Changes and Appointments.

The following transfers of District Inspectors and Inspectors of Stock have been approved:—

District Inspectors of Stock.—Messrs. W. R. Holmes, from Townsville to Warwick; J. J. Ashe, from Mareeba to Townsville; E. C. Lake, from Bowen to Mareeba.

Inspectors of Stock.—Messrs. J. B. Cardno, from Nanango to Bowen; J. Bishop, from Kingaroy to Nanango; W. Ford, from Boondooma to Kingaroy; L. P. Doyle, from Julia Creek to Camooweal; E. T. Lewin, from Toowoomba to Cloncurry; S. C. Allan, from Helidon to Julia Creek; S. J. Monaghan, from Crow's Nest to Toowoomba.

The position of District Inspector of Stock and Brands, Bowen, has been abolished.

The position of Manager, State Nursery, Bribie Island, has been abolished, and Mr. T. R. E. Mitchell, Manager, State Nursery, Bribie Island, has been appointed Acting Manager, Pawngilly Banana Experiment Station.

The designation of the positions of the following Officers of the Field Staff of the Department of Agriculture and Stock have been changed to "Instructors in Agriculture" and such Officers have been appointed Instructors in Agriculture:—

Messrs. O. L. Hassell, Assistant Instructor in Agriculture, Atherton; W. H. Bechtel, Acting Assistant Instructor in Agriculture, Kairi; S. M. Smith, Agricultural Field Assistant, Brisbane; R. A. Tarrant, Agricultural Field Assistant, Atherton; W. R. Straughan, Agricultural Field Assistant, Rockhampton; and A. Hamilton, Agricultural Field Assistant, Townsville.

Mr. Bechtel will continue to perform the duties of the position of Manager, State Farm, Kairi.

The designation of the position of Senior Field Assistant, Cotton Section, held by Mr. N. E. Goodchild, Maryborough, has been changed to "Instructor in Cotton Culture" and Mr. Goodchild has been appointed to that position, at Maryborough.

Mr. E. Pickering, of Eumundi, has been appointed Chairman of the Honey Board, and Mr. S. J. Howe, of Woombye, Chairman of the Strawberry Board.

Mr. C. R. Noyes has been appointed Chairman of the Moreton Local Sugar Cane Prices Board during the absence of Mr. S. L. Stormonth, and Mr. S. Pagano has been appointed Canegrowers' Representative on the Mourilyan Local Sugar Cane Prices Board, vice Mr. J. F. McCutcheon, resigned.

Constable C. W. Allen, Ravenshoe, has been appointed Temporary Acting Inspector of Stock whilst he is stationed at Ravenshoe, and has also been appointed Inspector of Slaughter-houses.

The appointments of Messrs. M. Flanagan (Bundaberg), F. A. Johnson (Willowburn), A. Black (Oxley), and W. L. Conn (Murarrie) as Inspectors of Slaughter-houses, have been confirmed as from 16th November, 1928, 19th November, 1928, 19th November, 1928, and 29th November, 1928, respectively.

Messrs. J. Macfie (Pomona), H. Lambert (Woombye), and R. J. Rollston (Brisbane) have been appointed Assistant Inspecting Cane Testers for the forthcoming sugar season, with headquarters at Cairns, Mackay, and Bundaberg, respectively.

Acting Sergeant S. J. Selby, of Babinda, has been appointed Inspector of Slaughter-houses.

Mr. W. Gibson has been appointed Millowners' Representative on the Bingera Local Sugar-cane Prices Board, vice Dr. A. J. Gibson, resigned.

The services of Mr. J. C. Pryde, as Temporary Inspector of Slaughter-houses at Toowoomba, have been continued for a further period as from 12th May to 11th July, 1929, during the absence of Mr. Tanton on sick leave.

Mr. J. L. Hodge, of Hendra, Brisbane, has been appointed Instructor in Sheep and Wool, on probation for a period of six months.

Messrs. E. C. Dunn (Taabinga Resumption, via Kingaroy) and J. J. Shelvey (Hendra, Brisbane) have been appointed Inspectors of Stock, on probation.

Successful Science Students.

Among the successful students at the last examinations of the Faculty of Science of the Queensland University were Mr. E. J. Ferguson Wood of the Bureau of Sugar Experiment Stations, Department of Agriculture, who obtained his degree of Master of Science, and Mr. W. A. T. Summerville of the Division of Entomology, Department of Agriculture, who obtained his degree of Bachelor of Science. Both students are young Queenslanders with very creditable Departmental and academical records, and are already well known to readers of the Journal as contributors on science subjects.

The Minister at Kilkivan.

The Hon. Harry F. Walker (Minister for Agriculture), in opening the Kilkivan Show on 29th May, complimented the ladies on their very fine displays of fancy work and culinary. He was impressed with the quality of the farm produce, which showed the progress made by the district in recent years in those lines, and he suggested that samples of the potatoes and maize should be exhibited in Brisbane. He eulogised the work of the students in the technical classes in the Rural School. Dealing with the dairy stock, Mr. Walker said that he had been informed by the judge that the Jersey bull shown was one of the best in Queensland. It was a great tribute to the breeder. There were also nice bulls in the Ayrshire and L.M.S. classes. The breeders were doing a great work for the whole of Australia, as by the improvements of herds and conservation of fodder they must increase their quota of exports.

Royal National Show—Ground Improvements.

A meeting of the Council of the Royal National Association was held on Thursday, 30th May. The chairman (Mr. J. Hiron) presided.

The acting secretary (Mr. H. W. Watson) reported that great general progress had been made in organising details as affecting the 1929 show. The district shows held during the month, many of which had been visited by representatives of the Council, had been attended with great success, and, what was of most importance, the general quality of exhibits in live stock and agricultural produce showed considerable improvement. The Royal National Association was now within ten weeks of the annual show, and, as it was possible to estimate more definitely what the possibilities were, he was confident that the 1929 effort would register that step forward which had most regularly marked efforts during more recent years.

The ground improvement programme outlined by the Council at the commencement of the present financial year had been steadily proceeded with and the wages sheet of the association exceeded £1,500 per month, exclusive of the heavy contract work which had proceeded during this period. The beef cattle and pig pavilions were now complete. The new concrete wall formation had been completed and was receiving its rough cast finish. The demolition of the old smokers' stand and adjoining buildings and the substitution of the fine wall and the building up of the rampway was regarded as one of the finest improvements to the grounds effected by the Council. Extensions had also been made to several of the refreshment rooms and greater facilities provided in connection with this most important service of providing the public with the necessary refreshments. The roads in No. 2 area had been raised to the extent of 2 feet and the centre and dry walk-ways in this area should now hold in any weather.

The motor pavilions, which the association was providing for the housing of motor exhibits, were in a state of preparedness, and it was recognised that the 1929 Royal National Show would see the greatest motor show yet staged in this State, covering some 60,000 square feet. The erection of the new fruit and horticultural pavilion was the last of the heavy improvements to be effected in preparation for the 1929 Show. The report was adopted.

Sugar Assessments.

The Sugar Assessments for the forthcoming sugar season have been fixed as follows:—Assessment under Regulation of Sugar Cane Prices Acts—1½d. per ton on every ton of sugar-cane received at mills. Assessments under Sugar Experiment Stations Acts—1d. per ton on every ton of sugar-cane received at sugar works. Cane Pest Boards Assessments—Plane Creek, 1d.; Mackay District, 1d.; Lower Burdekin, 2d.; Tully, 1½d.; and South Johnstone, 2d.

Citrus Levy Regulations.

These Regulations have been further amended to provide that, after the 12th April, 1929, the levy shall be at the rate of 2d. per bushel case, 1d. per half bushel case on all citrus fruit marketed, and 8s. per ton payable on all citrus fruit sent forward to canners, &c. The proceeds of this levy shall be expended half in the interests of the citrus fruit section of the fruitgrowing industry of Queensland and the balance only upon advertising in the interests of the growers concerned. The Regulations will be effective until 31st December, 1929.

A Bright Fruit Journal.

It used to be known as "Nicko's," the nick-name of its founder, that great-hearted and good Australian, George Nicklin. Then it was called "The Australian Fruitgrower, Fertiliser, and Poultry Farmer," and now, having bought itself a new overcoat, it has become "The New Australian Fruitgrower." At all times it is one of the cheeriest and brightest of our exchanges, and still wears its friendly grin and carries a warm shake or a hard punch in either hand. Its shake is preferred to its punch, but even that is delivered in a truly sporting way and always with a kindly smile behind the "hand-out." On every page is a glint of Queensland sunlight, brightening the wisdom and counsel of its columns. Like the industry it serves it is all-Australian in production. As a journal for the fruitgrower it compares favourably with any of our exchanges, and it should find a ready welcome on every orchard.

French Honour for Departmental Officer.

Count Gontran de Tournouer, B.Litt., Departmental Librarian, has been awarded the honour of Chevalier of Agricultural Merit, on the recommendation of Marshal Petain, in recognition of his services to General Pau's Mission to Australia. Count de Tournouer also received recently the decoration of Officier d'Academie from the French Government as a recognition of other services. He has been for a number of years a regular and able contributor to French and other periodicals on agricultural and kindred subjects. Prior to enlisting with the Australian Imperial Force, with which he served on Gallipoli, in Egypt, and in France, Count de Tournouer was engaged in the sugar and grazing industries in Queensland. He has travelled extensively in little known countries and, besides being a very fine linguist, is a gifted and versatile writer; and his stories and sketches have brightened the pages of several Australian journals. Count de Tournouer is a good Australian as well as a distinguished son of France.

Points in Planting Fruit Trees.

The roots of deciduous trees commence growing in the spring long before there is any move in the tops, and it is an advantage for the trees to be in their permanent positions when this first root movement takes place. Early planting, say, June and early July, is therefore advocated. The soil must not be too wet, of course, or it may become puddled.

Well-grown trees, one year from bud or graft, with well-developed roots are preferable. Long roots are very troublesome to settle satisfactorily when planting, and it is better to cut them back to about 8 inches. The bottom of the hole should have a crown in the centre so that the roots can be spread out with a downward tendency.

It is most important that the fine soil be rammed well in with the heel to bring it in close contact with the roots as the hole is filled in. The top of the hole should be left loose to act as a mulch. If planting when the soil is dry cannot be avoided, the holes should not be completely filled, and each tree should receive 8 or 9 gallons of water; when that has completely soaked away the hole should be filled up with dry, loose soil. A watering in this way is very useful in settling the soil around the roots, but care should be taken to avoid tramping close around the tree while the soil is soaked. The tree should be cut back to the desired height after planting.

A South Coast Sanctuary.

Previous Orders declaring sanctuaries in the Southport and South Coastal districts have been revoked and a further Order in Council has been approved, declaring the coast from the mouth of Coomera River to Point Danger and inland for a depth of two miles, to be a sanctuary for animals and birds. This area includes the town of Southport and the islands situated between Stradbroke and the mainland.

Open Season for Wild Ducks and Geese.

By an Order in Council the open season for wild ducks and geese in the No. 2 district of the State, which was declared by a recent Order in Council, has been varied. That Order in Council declared the open season for the whole of No. 2 district, to operate from the 1st June to the 31st October, but it has now been decided that so far as that portion of No. 2 district, south of the 22nd parallel is concerned, the open season will extend from the 1st July to the 31st October next. This, in effect, will mean that a close season will be in force in the Rockhampton, Gladstone, St. Lawrence, Clermont, and intervening districts, until the 1st July next.

Pig Farmers' School at Gatton.

The syllabus arranged for the forthcoming school of instruction for pig farmers, to be held this month at the Gatton College by the Departments of Agriculture and Stock and Public Instruction, is a very comprehensive one, and includes the following lecture course:—

| Subject. | Lecturer. |
|--|--|
| Agricultural Education | } Professor J. K. Murray, B.A., B.Sc., N.D.D., Principal of the College. |
| Microbes | |
| Principles of Feeding | |
| Economic Phases of the Pig Industry | } Mr. E. J. Shelton, H.D.A., Senior Instructor in Pig Raising. |
| Description of Breeds | |
| Design and Construction of Piggeries | |
| General Care of Pigs | |
| Judging | |
| Results of Cross Breeding | |
| Preparation of Pigs for Show and Market | |
| Weighing and Branding | Mr. John Hardecastle. |
| Fodder Crops | College Staff. |
| Anatomy | } Major A. J. McKenzie, Lecturer in Animal Husbandry. |
| Diseases of the Pig | |
| Improvement of Breeds | |
| Physiology | |
| Administration of Medicines | |
| Post Mortem Examinations | |
| Commercial Pig Farming | Mr. R. G. Watson. |
| More Money in the Farmer's Pocket | Mr. J. F. F. Reid, Editor of Publications, Department of Agriculture and Stock. |
| Pig Hygiene | Mr. H. G. Cheeseman, Senior Slaughtering Inspector, Department of Agriculture and Stock. |
| Farm Book and Record Keeping | Mr. J. H. Woodward, Senior Clerk, Queensland Agricultural College. |
| Soils | The Principal, Technical College, Ipswich. |
| Disinfectants | } Mr. C. J. Pound, Government Bacteriologist. |
| Tuberculosis in Pigs | |
| Marketing Pigs | A Representative of the Bacon Curers' Association. |
| Pig Clubs | The Organiser of Agricultural Projects, Department of Public Instruction. |

Open Season for Opossums.

By an Order in Council an open season of one month for the capture and destruction of opossums has been declared in all districts in the State. This open season will extend from the 8th July, 1929, to the 7th August, 1929, both days inclusive.

In giving favourable consideration to the question, the Minister for Agriculture and Stock (Mr. Walker) announced that the Government was influenced by the fact that protection has been afforded since 1st September, 1927, and reports called for and received from reliable sources indicate that in a number of areas the opossum is again in large numbers, and in the majority of districts where they thrived prior to the last open season they are again fairly plentiful.

A factor which was also given consideration in opening the season was the desire of the Government to provide employment for those who wished to take advantage of an open season and who at the time might not be absorbed in industrial undertakings. It is anticipated that a considerable sum of money will be also put in circulation as a result of the proceeds of the sale of furs.

The limitation of the open season to one month should ensure, at the end of the period, that sufficient numbers of opossums are left for propagation purposes.

An indication of the value of the opossum fur industry may be gathered from the fact that during the open seasons in 1926 and 1927 a total of 3,500,000 skins was sold at a value of £832,000.

The Minister also stated that he has under consideration the adoption of measures for the propagation of the opossum, which will tend to create breeding grounds for these native animals in districts most suitable for the purpose. He hopes, in this way, to provide regular supplies, and to ultimately place the fur breeding industry in the State on a systematic and profitable basis.

New Objectives in Wheat-breeding.

Farrer achieved such wonderful success in wheat-breeding in Australia, particularly with his variety Federation, which is still grown largely in Victoria and New South Wales, that it was considered by many that the pinnacle had been reached, and that very little further progress could be made.

The work which has been continued by plant-breeders, writes the Director of Plant Breeding of the Department of Agriculture, New South Wales, has been rather in the direction of producing earlier varieties of high productivity, and both Canberra and Waratah are outstanding examples of the success of this objective. A change in the objectives in wheat-breeding, however, has necessarily been brought about in recent years through the increasing ravages of diseases, which take a heavy toll of the crop in some years. The present leading varieties—Federation, Waratah, and Canberra—all suffer from the effects of diseases in certain seasons and under certain conditions, while it is known that other varieties are not so badly affected. This indicates a varietal resistance or susceptibility which the plant-breeder must consider in the production of new wheats, if they are to be superior to the present varieties.

In his day, Farrer did not have to concern himself with breeding for resistance to flag smut, but this phase is now regarded as one of the most important objectives of the wheat-breeder. By keen observation, Farrer achieved a certain measure of success in breeding rust-resistant wheats, but in his time nothing was known of the specialisation of physiologic forms of rust, some varieties being resistant to some forms and susceptible to others, and Farrer could not, therefore, make the headway in this work, which is now being undertaken with a wider knowledge of the incidence and a better understanding of the inheritance of rust, and which, therefore, promises much greater success than Farrer achieved in this direction.

Other diseases are also being investigated from the varietal aspect to discover, if possible, whether any varieties have an inherent resistance which can be turned to account by the plant-breeder. Moreover, the wheat belt is extending each year into districts of more limited rainfall, and wheats of greater inherent drought resistance are needed than when Farrer was engaged in this task.

Though the task of the wheat-breeder has been rendered sterner and his problems more difficult since the time of Farrer, we can never detract from his wonderful work; firstly, because his Federation wheat has held pride of place for so many years, and, secondly, because many of the most promising varieties to-day in Australia still have a large mingling of Federation "blood."

Men and Machines.

"There could be no more false, no more mistaken view," said Lord Londonderry in a speech at Newcastle, England, recently, "of the needs of industry to-day than the over-emphasis upon the present age as the mechanical age, in which the human element in manufacture has been practically eliminated, and the operative reduced to a mere machine-minder. While it is true that science and machinery enter ever more and more into the creative processes, this has not meant, and, as far as I can see, never will mean, the replacement of human skill. It has only meant a shifting, not a lifting, of the burden upon man. It has necessitated a greater use of the intelligence of the worker, and a smaller demand upon him for actual manual dexterity. Man himself still remains the most wonderful machine in the world, and, though his muscles may be called upon less and less, his mind, his intellectual powers, are being called into service more and more every day."

Wintering Conditions for Bees.

The provision of good wintering conditions, by enabling the worker bees to conserve their energy, has an important influence on the honey-producing capacity of a colony.

The length of life of worker bees is governed by the energy they put into their work. For instance, during a honey flow, when the condition of the colony is normal, with young bees hatching freely, the bees put so much energy into their work that they become quite aged and usually succumb in six or seven weeks. If, on the other hand, any abnormal condition (such as the loss of the queen) takes place, then to some extent the bees will conserve their energy so that their lengthened life will give the colony a chance to recover. The period at which this conservation of energy is most desirable is during the winter, and it is at this season that the apiarist himself may help.

If wintered in a good hive with ample stores under favourable conditions, the young bees of a populous colony will come into spring with comparatively undiminished energy, so great is their power at this period of conserving their vitality. The case of a colony in a low-class hive, which has excessive space or insufficient stores, or which allows a draught through the cluster, is very different. The draughty state of the hive necessitates considerable activity on the part of the bees in order that the temperature may be maintained, and the extra energy expended shortens their lives proportionately. Insufficient stores cause the bees to economise and consequently lowers their vitality still further.

Points in Packing.

Use a clean case with stout sides and flexible tops and bottoms.

If making cases, use nails of sufficient length and gauge to hold the boards.

Grade carefully for size and quality.

Avoid using an open edge pack where possible. Use a closed edge pack for first preference, and a flat pack for second preference.

Handle the fruit with extreme care—remember that much damage is caused by common rot organisms which gain entrance through a broken skin. Use a wrapper of sufficient size to completely cover the fruit, and finish the wrap over the stalk so that it will form a pad and prevent the stalk protruding through the paper and puncturing the apple next to it.

A little wood wool placed on the bottom of the case and on the top of the last tier protects the fruit.

To prevent cleats from splitting soak them in water before using.

Finish the pack with a slight bulge.

Do not pack slack—it causes bruising.

Do not place the case flat on the floor when nailing it down. Place battens underneath or use a nailing-down press.

The wiring of cases is strongly recommended; they increase the stability of the box. When wiring, the machine should be placed on the side of the case. The wires should be placed near the cleats at each end of the case.

Use a well-designed attractive label.

Mark your cases in accordance with the grading regulations. If using a stencil, see that the markings are easily decipherable. Plain, attractive markings facilitate handling of fruit and are of great assistance to both buyer and seller.

Do not walk over cases.

Sweep out trucks before loading the fruit, and stack cases on their sides, not on the bulge.

Dipping of Lambs—A Southern Trial.

The results of dipping trials at Bathurst Experiment Farm (New South Wales) this season confirm those of previous experiments, demonstrating that dipping has no detrimental effect on the growth of lambs if properly carried out.

Fifteen lambs were selected and divided into three equal lots. One lot was dipped in a carbolic dip, one in an arsenical powder dip, and the third lot was left undipped as a check. Fairly small lambs were selected so that they would not be sold in the first draft that went to market. The lambs were weighed prior to dipping (5th December) and again on 9th January, with the following results:—

| | | Weight, 5th Dec. | Weight, 9th Jan. | Increase. lb. |
|---------------|-------|---------------------|---------------------|------------------|
| Carbolic Dip | .. .. | 64.2 | 77 | 12.8 |
| Arsenical Dip | .. .. | 65 | 72.8 | 7.8 |
| Undipped | .. .. | 64.4 | 74.6 | 10.2 |

Sheep should not, of course, be dipped when in an overheated condition, but lambs will naturally rush about more than older sheep. In trials carried out previously at Glen Innes Experiment Farm, lambs that had been driven around the yards until they were hot and breathing very quickly and then put through the dip showed no ill effects in their general appearance, and an average increase in weight of 12½ lb. in five weeks was recorded. In some cases a slight difference, not amounting to a break, was subsequently noticeable at that part of the staple which would have been at the surface of the skin at time of dipping.

Worms in Sheep—An Effective Drench.

The efficacy of the copper sulphate and mustard drench for treatment of stomach worms in sheep has frequently been referred to in these notes. As the trouble is one which is occupying the attention of a good many sheepowners at present, details of the drench and method of administration are repeated.

To prepare the drench dissolve 4 oz. of powdered copper sulphate (bluestone) in a pint of hot water, using an enamel or earthenware dish. When thoroughly dissolved, add 4 oz. of mustard. Then add cold water to make up to 1½ gallons, using an enamel bucket or earthenware jar. This will be enough for 100 adult sheep, allowing for waste. The doses of the mixture are—

| | Ounces. |
|--------------------------------|----------|
| Grown sheep (4-tooth and over) | 2 |
| One-year-old sheep (2-tooth) | 1½ |
| Lambs | 1 |

If it is desired to use a weaker solution, the drenching mixture may be made up by taking the drench as prepared above and adding an equal quantity of water. The doses would then be 4 oz., 3 oz., and 2 oz., respectively.

Instead of the ordinary galvanised drenching tins, those made of sheet copper are to be preferred, as the action of bluestone on galvanised iron is highly corrosive, and such tins wear out very rapidly. Three different sizes of drenching tins are required to hold the respective doses mentioned above.

It is advisable to bring the sheep into the yards the night before, and to drench after a preliminary fast. No water should be allowed for two hours after drenching. The sheep should be drenched in the standing position, with the head held horizontally or slightly raised. The head must not be forced far back, or the drench given hurriedly, otherwise choking may result, or some of the liquid may enter the lungs and set up pneumonia.

Drenching should be repeated in about fourteen days' time, and again if necessary one month later if the best results are to be obtained. On properties where worm infestation is serious, regular systematic drenching should be adopted. It must be remembered that drenches simply destroy and expel the parasites, and do not render sheep immune. Thus the sheep will become reinfested by the many thousands of ensheathed larvæ still present in the pastures. By repeated drenching, say, at monthly intervals, these young parasites are destroyed as they get into the sheep, and before they are able to propagate to any extent. Thus by regular drenching it is possible to clear up the parasites in wormy areas.

Regulating Dairy Production.

The desirability of "evening up" production throughout the year, and how it might be accomplished, was discussed by Mr. E. H. Filmer at a recent conference of South Coast (New South Wales) farmers.

By having, say, 10 per cent. of the cows calving every month, it was contended there would be a continuity of supply of fresh cows in the herd and a more steady flow of production, providing there was a supply of good feed, natural or conserved, all the year round. By such a distribution of production throughout the year the price obtained would be made more even and perhaps a shade improved. As things were, if the season was good a large percentage of the dairy farmer's product was exported, and returns were not always as good as the local prices. When winter came they found that butter was imported from other States. It was rather galling at times after exporting their so-called surplus at a loss on local prices to find that they had to import butter at a higher rate to fill requirements.

Another method of regulating the dairy herd was to keep the sire from the cows until, say, November or December, and then get them all in calf in a month or six weeks, and thus have them calving in September and October. By this means the whole herd would be dry during July and August, thus giving the farmer time to do some other work or to take a well-earned holiday. Further, the cows were dry at the least productive period (on natural pastures). The disadvantages of this system if generally practised would be over-production during spring and summer, necessitating export or storage, and a tendency to reduce the price, also the fact that butter factory plants and staffs would be idle, and he did not think that the inevitable dislocation all round would be in the best interests of the industry.

Another disadvantage would be that in a fair-sized herd of, say, sixty cows the farmer would probably have to keep two or more bulls. Added to this there was the fact that for ten months in the year the bulls were idle, and it was very probable if they did not become a nuisance to their owner that they would do so to his neighbours. Again, most cows when in season caused unrest among the remainder of the herd, which did not make for smooth and quiet working, and conditions in this respect would be proportionately worse.

He much preferred the first method. There was no two or three months holiday in it as against the second one, but once one got it going it made for smooth working, even production, and regular cheques.

Surplus Combs—Fumigation for Wax Moth.

When combs have to be stored for any length of time care should be taken to prevent damage by the wax moth larvæ, for such combs are of great value for future development in the apiary. Bees will store honey in combs at times when they will not build out comb foundation.

As the pest is not so troublesome during the winter months, the removal of one comb from each body and the piling up of the bodies on four tins, so as to prevent damage by mice, will usually suffice as a protection. No cover or bottom board should be used, so that air may circulate through the pile freely. The room in which the bodies are stored must be bee-proof, to prevent any robbing by bees. Some apiarists place a wire cloth screen top and bottom of the pile. The combs should be examined about once a month during the winter, and any showing signs of infestation should be set aside for fumigation.

The piles should be treated in the following manner:—First scrape all propolis from the top and bottom edges of the supers, in order that the bodies may fit tightly and thus retain the gas. On top of each set of combs place a cloth about 10 inches square (doubled) and over this pour a tablespoonful of carbon bisulphide. Cover the cloth with two thicknesses of newspaper to ensure a tight joint, and place another body on top and treat in the same way, and so on with the remainder of the pile.

Great care is necessary in using carbon bisulphide, as it is a poisonous and very inflammable gas. Fumigation is best carried out under a verandah or in the open; if the work is done indoors there should be ample opportunity for the free circulation of air if risk to the operator is to be avoided. On no account should a light of any sort be allowed in the vicinity of the gas, as a spark is quite sufficient to cause an explosion.

Sulphur fumes are quite effective for the fumigation of slightly infested combs. To fumigate by this method, prepare four or five bodies of combs, take a pan containing red-hot coals, throw on to the latter a handful of sulphur, immediately

place over the pan an empty full-depth super, then the bodies containing the combs, and finally place a good close-fitting cover over all. The combs can be left over the fumes for an hour.

The carbon bisulphide treatment is the more effective, and is recommended if combs have to be kept over a fair period.

During the early spring populous colonies of Italian bees will take care of a few of the surplus bodies and combs.

Very heavily infested combs should be melted up.

Silage is Real Money.

The market value of silage is not fixed, as is the case with hay. In nearly every case the fortunate farmer who possesses it regards it as of so much value to himself that he will not sell it. It has, however, a very definite market value. During a recent dry spell the manager of Wagga Experiment Farm (N.S.W.) was offered £8 per ton for pit silage. Considered from the point of view of its actual food constituents it may not be so valuable as hay, but its succulence is an important feature, and renders it of considerable value, particularly in a lean period, when succulent feed is the very class of which there is a special scarcity.

As farmers are beginning to appreciate, the security afforded by reserves of silage has a very real monetary value. The value of such a reserve is not merely its value as fodder—it is the value of the profits accruing from the enterprises which the reserve has made possible.

Better Pastures for Dairy Cattle.

If stock have access to succulent pastures they are less liable to become affected with such troubles as rickets, bone-chewing, &c., which are generally associated with poor pasturage. Much poor land will produce infinitely better feed if it can be broken up and sown with suitable grasses and clovers. On some of the country implements cannot be worked, but winter-growing plants, such as Wimmera rye, Italian rye, Perennial rye, Cocksfoot, Sheep's Burnet, and Subterranean clover can be scattered in suitable places on these areas, writes the Agrostologist of the Department of Agriculture.

By having numerous small paddocks, rather than a few large ones, a system of rotational grazing can be adopted, and by establishing some paddocks of winter grasses and others of summer pastures, each can be grazed at the time when they contain their maximum amount of nutritive material. The grasses and clovers can thus be handled in such a way as to enable them to rest, recuperate, and seed at the correct time, thus maintaining the maximum degree of efficiency in each. Attention should be given to sowing mixtures of grasses and clovers most suitable for the district, and particularly those which provide feed at those times of the year when the natural pastures are at their worst.

If the property is well subdivided, the pastures can be utilised when the feed is most nutritious. Milking cows require palatable feed rich in protein, and the grasses should be fed off when the growth is young, but as the plants mature the fibre increases and the percentage of protein diminishes.

The use of fertilisers, such as superphosphate, stimulates the growth of grasses and legumes, and the amount of mineral matter in the plants is increased, particularly the elements lime and phosphorus, which are essential for the animals' development. Stock grazed on pastures deficient in these substances invariably become "bone chews," but by feeding the pasture with fertilisers, the composition of the plants is considerably improved. Where a marked increase in the lime content of the soil takes place, the percentage of nitrogen in the pasturage also increases.

Stock prefer top-dressed portions of a paddock to unmanured sections, because—
(1) They are obtaining more lime and phosphorus (two substances essential to the building up and maintenance of the animals' framework), and (2) the top-dressed pasture is more palatable and nutritious, and contains a greater amount of protein, due, mainly (a) to the increased growth of clovers and (b) to the increased percentage of nitrogen present in the pasture as a whole.

Therefore, by nourishing the pastures, not only is a greater quantity of feed obtained, but a considerable gain in the nutritive value of the plant is effected.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of increasing their health and happiness and decreasing the number of avoidable cases of infant mortality.

THE NATURAL FEEDING OF BABIES.

Every mother should realise how important it is that her baby shall receive his natural food—that is, his mother's milk. That milk has been supplied by Nature for that special baby, and is adapted to his special needs. Doctor Sir Truby King says, "A woman's milk is not her own. It is created for her baby, and the first duty of the mother is to ensure, by foresight, a proper supply of the only perfect food—the baby's birthright." Almost all mothers can feed their babies, if they desire to do so. If they have not a quite sufficient supply of milk for the baby's full needs, he must not be weaned on that account. Give him what there is, and finish his feeding with a little very slightly sweetened artificial food. At the same time try to increase the breast milk supply. This can and should be done. Any Baby Clinic nurse will show you how to do it. Even a little mother's milk is very valuable for the baby, and helps him to digest the artificial food which may be necessary. There are many reasons why breast milk is best for baby. As has been said before, it is his natural food, and contains in the right proportions all the food ingredients necessary for baby's growth and development.

Give the Infant a Good Start in Life.

The death rate among breast-fed babies is much lower than among artificially-fed infants. Statistics tell us that, of the babies who die in their first year, a large percentage of them are artificially fed. A breast-fed baby is much less likely to contract disease than one who is artificially fed, and, if illness is contracted, the baby fed on his mother's milk makes a quicker and better recovery than does the bottle-fed baby.

The child who is breast fed during his first year is stronger and healthier during his second year than the one who has been artificially fed.

The Wisdom of Mother Nature.

In addition to these advantages to the baby, there are advantages also to the mother's health. Besides this, mother's milk is always ready; there is no troublesome preparation of bottles and mixing of foods. Thus it is a great saving of time for the mother. It is always the right temperature, and is germ free. Also much money is saved that would, for the bottle-fed baby, have to be spent on infants' food, bottles, teats, bottle brushes, &c. So give baby what Nature meant him to have, his mother's milk, and leave cow's milk for the baby calf, for which it was intended. In addition to all of these reasons, the baby who is dependent on his mother for the food he receives is more devoted to her than the child who is satisfied to be fed out of a bottle, by anyone, and the mother more dearly loves the baby whom she has fed with her own milk. Some mothers wean their babies because they think they are not strong enough to nurse them. This is a mistake; the health of the mother is, in nearly all cases, improved while nursing her baby. Others think that their milk is poor in quality, because it is thin and watery looking. But analyses of many samples of mothers' milk have proved that this pale, watery-looking milk is quite rich in quality, and contains all the nourishment needed by the baby. Still others talk of "windy milk," and wean on that account, but wind is never drawn from the mothers' breasts. "Wind" in the baby's stomach is air that he has swallowed. Other frequently heard causes for weaning are frequent green motions, attacks of screaming after feeding, frequent vomiting, and loss of weight. These are nearly always due to indigestion caused by overfeeding, especially in the early days. Babies are often weaned because the mother thinks she is losing her milk. In many of these cases, inquiry elicits the fact that the mother is substituting one or more bottle feeds for breast feeds, or is "keeping the breast for the night," and bottle feeding during the day. There is no surer or quicker way of weaning baby



Photo.: Dept. of Public Instruction.]

PLATE 128.—[IN A STATE SCHOOL GARDEN IN SUNNY QUEENSLAND.]

than by these means. The best way of keeping up the supply of mother's milk is by the regular and vigorous sucking of the baby. Put baby to the breast every three or four hours during the day for from fifteen to twenty minutes. Give no night feeds from birth.

The Best Food for the New Australian.

Another mistake which is often made, and which may result in baby's refusal to take the breast, is feeding him on sweet foods, condensed milk for instance, during his first two days of life, before the mother's milk comes in. If that is done, baby gets used to the taste of the artificial food, which is sweeter than his mother's milk. He also finds that taking milk out of a bottle is easier than sucking. As a result he fights and protests when put to the breast, and refuses to suck. This may also happen if the new born baby is given a "dummy," especially if this is dipped in honey or any other sweet stuff. The mother is worried by this refusal, and, in consequence, her milk supply decreases. Also, because baby has not taken the breast, more of the artificial food is given to him, and as a result he is soon entirely weaned.

Babies should never be given artificial food during their first two days. Give them plain boiled water only. If they required feeding then Nature would have supplied the food.

TWELVE BEST GARDEN ROSES.

The following interesting paper was read by Mr. B. Watkins, B.Sc., M.Sc., president of the Horticultural Society of Queensland, before members of the society:—

The title of this paper is one which may lead to the belief that I am going to name twelve roses which are considered to be the best twelve garden roses. Such is not the case; it is my desire to discuss those roses which have some claim to inclusion among the best twelve. There is really no finality to the question of the best twelve garden roses. Experience with roses differs. One rose grower will find a particular variety an assured success, and a second grower reports the same variety to be a failure. Such is the case with the rose Hadley. It is temperamental—successful in one quarter and only mediocre in another place. No one person can list twelve roses as the best twelve for Brisbane—a personal list is the result of one's experience. Yet by collecting as many such lists as possible from growers in and around Brisbane and dissecting them a fair average indication is the result. Such a plebiscite should be made from time to time by the society, and the results published for the guidance of beginners. Southern societies treat this matter seriously, and a valuable guide to varieties to grow results from the voting.

Some years back the Brisbane "Sunday Sun" called for an expression of opinion from its readers as to the best twenty-four roses. The result of the plebiscite was as follows:—Maman Cochet, White Maman Cochet, Hadley, Radiance, Penelope, Lady Hillingdon, F. K. Druschki, Madam Abel Chatenay, George Dickson, Mrs. Herbert Stevens, General Macarthur, Laurent Carle, K. A. Victoria, J. J. L. Mock, Madam Segond Weber, Rhea Reid, W. R. Smith, Lady Alice Stanley, Duchess of Westminster, Madam Constant Soupert, Columbia, Alexander Hill Gray, Perle des Jardines, Star of Queensland. Many of these varieties must give way to better varieties of recent introduction.

Whilst on the matter of a plebiscite, there is a further point that deserves consideration. One is apt to be rather partial towards a rose and allow such partiality to blur one's general outlook when considering the best twelve, resulting in a list of one's favourites rather than an impartial, unbiassed opinion of the best twelve. My favourite rose is Reverend F. Page Roberts, and perhaps next comes Betty Uprichard; yet I would never consider either variety worthy of inclusion in the premier twelve. It is my desire to be impartial and non-dogmatic in dealing with this subject.

A good garden rose is one that possesses vigorous, strong growth, carries its flowers erect on long straight stems well above the foliage. The foliage should be disease resistant, and not readily shed. The variety should be in constant bloom, and the blooms should be capable of holding together under the various climatic factors characteristic of the area. The colour should be lasting, and the flowers carry at least three rows of petals. Such a definition rules out all the single and semi-single varieties and many roses which, although favourites, bloom only at limited periods, such as George Dickson.

In the above review the first varieties claiming attention are that trio of worthy roses—the Radiance family. In 1904 J. Cook produced a new rose named Cardinal, from Liberty, and an unnamed red seedling. Liberty is a red rose still prominent in many quarters, particularly its climbing form. Its progeny, Cardinal, is at present not listed locally. The same hybridist, by crossing Cardinal and Enchanterer, in 1908, produced probably the most popular garden rose both here and in America. This rose is known as Radiance, and is identical with Reliance. The rose is so well known it requires little discussion. A climbing form of Radiance from the South should be justly popular. In 1916 Radiance sported an identical variety in all but colour, and Red Radiance was listed by two Southern firms. Why Radiance should have thrown identical sports in two distinct gardens is a mystery. Just as much a mystery as that surrounding the fact that this same rose sported climbers in two distinct places at about the same time. A climbing sport from the Pacific Rose Company appears in Southern catalogues, whilst in the Oxley garden of Mr. Alfred Marshall a similar climbing sport appeared last year. Some years ago Mr. Marshall met with a similar experience when White Maman Cochet sported a climbing form in his garden, but was anticipated by a similar sport from the South.

The last member of the family, Mrs. C. J. Bell, or shell pink Radiance, originated in 1917 from the nursery of A. N. Pierson, one of the originators of Red Radiance. It has taken a little longer to find its way into commerce in Brisbane, but is a really beautiful rose of a delicate soft salmon colour worthy of a place in any garden.

The trio bears flowers which are identical in shape, being cupped and globular, and for that reason do not find a place among the exhibition roses, although at times they appear in the bud-to-full-bloom class. Of the three, I consider Red Radiance shows the best form, at times claiming attention from the exhibition viewpoint. All three possess a most beautiful and persistent perfume, and all drop their petals as a whole. In vigour I find Red Radiance foremost, with Mrs. C. J. Bell least vigorous, but nevertheless a vigorous rose. The same order is preserved in the case of floriferousness.

Though Red Radiance carries the name indicative of its colour, it is by no means a true red, but rather cerise. I do not think it should be classed as a red rose accordingly. In considering the most popular red rose, there should be no hesitation concerning the premier place. It is justly claimed by Etoile de Holland, sometimes called Star of Holland. I consider this rose, Radiance, and Red Radiance are the foremost trio of garden roses to date. Etoile de Holland stands almost supreme in every rose-growing country in the world. Originating from the Dutch nursery of H. T. Verschuren, in 1919, this rose rapidly became a favourite, and has maintained its premier place ever since. Its popularity can be readily understood when one considers its qualities. Its only fault, to my mind, is a tendency to weak stem, the very large size of the flowers accentuating this. This weakness can be minimised by the use of sulphate of potash scattered around the plant. Some incline to the opinion that this rose is too thin in petalage and lacks substance, but my personal opinion is that therein lies its greatest charm as a garden rose. It lacks the formality of an exhibition rose, but the giant petals, usually half recurved in the case of the outer row, give to the bloom a form and appearance which no amount of rose dressing could improve. The perfume is overpowering, and is described as a damask musk. In colour Etoile de Holland is a rich bright red overlaid with that blackish-crimson hue and velvety sheen so characteristic of the old H.P. reds. Its lasting qualities are exceptional, and as a house decorative it is hard to surpass. This rose is highly prized in England, America, and on the Continent, and stands very high in favour in Queensland.

Its history is interesting. According to the raiser, it is the result of a cross between two well-known reds—Hadley and General Macarthur. Further, General Macarthur, Liberty Richmond, and an unnamed seedling were utilised in producing Hadley. Accordingly, Etoile de Holland is an inbred rose, the more remarkable as it preserves the good points of both parents with just that one fault of weak stem, inherited no doubt from General Macarthur. The colour of Etoile de Holland can be traced as a blend of its two parents, but the tendency to blue so apparent in both parents is a very minor matter with the progeny.

This introduces two more red roses to our notice. With me Hadley is an assured success, and will always find a place in any garden with which I may be concerned. It is a constant bloomer, giving very full, high pointed, well-shaped roses, though at times confused. The blooms are carried on long, wiry stems held very erect and carrying little foliage. Its perfume is delightful, and its lasting qualities are good, excepting that it is very subject to blueing at certain times. Occasionally also it gives small blooms inclined to be crippled, but its faults are

easily overshadowed by its merits. A climbing form of this red comes into commerce this year, and will be an assured favourite. I am not so keen about General Macarthur. It was first sent out by E. G. Hill in 1905, and at that time readily found a place in public favour. Many of our older rose growers still hold it in high esteem, but I think it must give way to worthier opponents. It opens rather flat, showing the centre rapidly, at times rather small in size, and it blues. A climbing sport of recent introduction, is a rampant grower, though not particularly free in bloom.

Two years after the introduction of General Macarthur, that worthy French firm of hybridists introduced a red rose named Laurent Carle, which remains to-day as a very popular rose. Not a particularly tall grower, yet always doing well, the rose maintains its position in public favour on account of its dark-red colour, sweet, rich perfume, good form and carriage, consistent blooming, and freedom from disease. A recently introduced climbing sport is a worthy addition to the red climbers. I find it the most consistent bloomer among the red climbers. In fact, among all climbers it is an outstanding variety on account of its freedom of bloom. In addition, it is a medium climber, and easily kept within bounds. In 1922 the firm of S. McGredy and Sons sent out a red rose under the name of Lord Charlemont. This rose has each year shown evidence of increasing satisfaction, and will take its place among our best garden roses. I first secured this variety as a novelty, and it never looked back. I received more genuine satisfaction from this particular plant than from any other rose I have ever grown. It gave me dozens of perfectly shaped, long-pointed, rich-glowing crimson blooms with a characteristic veining, its blooms erect on good stems and resisting disease successfully. Although considered by some to be perfumed, I have never detected any perfume of note. This lack of perfume is one of its faults. Had this rose the perfume of Etoile de Holland, I would consider it to be as near to the ideal as possible.

In concluding the discussion of red roses one must not omit our own Star of Queensland. True, it cannot aspire to exhibition honours, but it is a valuable garden rose, of a very dark-red colour, globular in form, and of mixed petalage, with good fragrance. It was introduced in 1909 by Mr. Williams, of Sunnybank, and, if my memory serves me correct, it is a cross from Earl of Dufferin and Etoile de France, and shares many of the characteristics of the latter parent. It is a good grower and disease resistant, and worthy of attention from growers situated under climatic conditions akin to those of Brisbane.

Whilst on this question of local hybridising, I might mention of Mr. Williams' other success in Penelope. This is a well-known bicoloured rose, but is distinctly temperamental. It is an assured success in some quarters, and a rank failure in other parts. I can never subscribe to the opinion that it even ranks among our best twenty-four roses. This completes the review of the red roses, which I consider claim attention from the present standpoint. I place Etoile de Holland first, Hadley next, Lord Charlemont, Laurent Carle, equal for third place, and then Star of Queensland. Others not reviewed, but worthy of attention, are Hoosier Beauty, Mrs. Henry Winnett, Royal Red, and Sensation.

In dealing with pink roses, no dearth of good garden roses is experienced. I have discussed two already in the Radiance trio. There is no doubt that Radiance ranks very high in favour, and would probably secure premier position as the best pink garden rose. Probably next in favour would be J. J. L. Mock and Madam Abel Chatenay. The former is a rose grown by almost everybody, and probably no show passes without its appearing on the tables. Nevertheless, it is by no means an ideal exhibition variety, for it lacks form and finish. At times it opens into faultless blooms, but is usually inclined to be globular, with the edges of the petals curling over and hiding the centre. Again, it tends towards coarseness. In spite of these faults, and that of little perfume, it maintains a reputation based upon its freedom of bloom and the fine, upright carriage of the blooms on long, straight, solid stems, which are characteristic of the strong, upright growth. I have a tree of this variety 8 feet high but only 18 inches across. This very upright growth makes it possible to grow this variety close together. The fine dual toning of this rose is a conspicuous feature. Shell pink on the inside of the petals contrasts strikingly with solid imperial pink on the reverse. It is a remarkably good rose for internal decoration, as it lasts for a very long period of time. This accounts to a great extent for its popularity. A climbing form now in commerce appears to me to be an extra-strong form of the dwarf, and so far does not show vigorous climbing form in my garden.

Madam Abel Chatenay, a well-known salmon-pink rose, is a variety which inclines toward struggling growth and defoliation, but nevertheless it is a fine

garden-rose. It carries an abundance of bloom, which, though not particularly good in form, possess an impelling attractiveness with their contrasting colours, silver on inside and deep salmon on the reverse.

Climbing Madam Abel Chatenay is perhaps the most valuable pink climber in vogue. It is always in bloom, and gives hundreds of large fine blooms identical with the dwarf. It is a strong grower, and needs plenty of room for development. I consider both the above roses should find a place in the best twelve. A little more difficulty is experienced when reviewing other pinks. That well-known rose, Columbia, always has a large following. Personally I have never had any very great success with the dwarf variety, though the more recent climbing form is a rose whose growth is difficult to control. The dwarf form is spoken of highly in many quarters, but it suffers from one very serious fault—the blooms are frequently crippled and open into small, misshapen flowers of no value. This is a serious drawback to an otherwise good variety. When good, Columbia is something to dwell upon. Under such conditions it is a faultlessly-shaped, high-pointed, richly-perfumed rose, of a glowing pink, rich and warm, which deepens with age. The blooms keep remarkably well, and the plant is very resistant to disease. This variety hails from the nursery of E. G. Hill, and was put into commerce in 1917. It is a rose that all should grow, for the beautiful flowers with which it rewards its grower at favourable seasons more than compensates for its occasional failures. Each year sports of this variety appear in commerce, among which are found New Columbia, Silver Columbia, Scott's Columbia, Mrs. Warren C. Harding, and Briarcliffe.

KITCHEN GARDEN.

Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. In fine weather get the ground ploughed or dug, and let it lie in the rough until required. If harrowed and pulverised before that time, the soil is deprived of the sweetening influences of the sun, rain, air, and frost. When the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

RHUBARB.

The continued production of rhubarb may be greatly assisted by giving a heavy mulching of manure and hoeing it well into the soil. Keep the beds well watered, and give regularly a dressing of liquid manure, say, once a week.

It is not necessary to use forcing manures on the young stock, as plants are ruined if forced in the early stages of growth.

The rhubarb makes rapid growth during the autumn and spring, and when stalk cutting has been started liquid manuring and manuring may be given.

LETTUCE CULTURE.

A thin sowing of lettuce seed where the plants are to mature insures not only an earlier crop, but it will be found that the plants grown in this manner are far less likely to run to seed than others transplanted from over-crowded seed-beds.

Lettuce resents checks in all stages of growth, and through inattention in the early stages many losses occur through early seeding. An undisturbed plant may be relied upon to give a good head at least a fortnight or more in advance of others, and for this reason alone it is worth while taking a little extra care in preparing the bed and sowing the seed.

A liberal dressing of manure is always beneficial to this crop, for, in addition to the food value, it retains moisture and keeps the roots cool during the hottest weather. Cow manure is the best, but whatever manure is used should be buried 9 inches below the surface. If it is put in deeper than this, the roots will not reach it until the plant is well developed, and therefore unable to take full advantage of the food provided. Unlike many more delicate plants, the roots of lettuce will penetrate rank manure even when quite small, and grow very rapidly.

Sow lettuce seeds in drills running from north to south. Draw them out with a blunt stick deep enough to allow a scattering of finely-sifted soil being placed in the bottom, and the seed being covered 1 inch deep. This will ensure an early and very even germination. When the seedlings are about 1 inch high, thin out to one plant to every 6 inches of the row. Frequent stirrings of the soil, and an occasional dusting of soot will induce rapid growth, and if, when the plants are half-grown, the surface of the bed is given a dressing of either nitrate of soda or sulphate of ammonia, at the rate of $\frac{1}{2}$ oz. to each yard of row, and lightly forked into the ground, and afterwards well watered in through a fine-rosed can, the plants will readily respond. Good results will follow an application of liquid manure or even soot water.

THE CARE OF THE LAWN.

For a lawn to be a success it must be carefully made in the first place. Good drainage is essential, for stagnant water-logged soil encourages weeds and kills the grass. The soil should be rich in plant food. Give the ground a heavy dressing of good manure, and thoroughly dig it over. Enough time should then be allowed for the soil to settle, as it must be firm when the grass is planted or there will be a series of hills and hollows shortly after. In addition to the manure apply the following mixture at the rate of 3 oz. to the square yard, forking or raking it well into the top spit of the soil:—2 lb. superphosphate of lime, 1 lb. bonemeal, and 1 lb. sulphate of ammonia.

Early in the spring, as the grass begins to grow, a heavy roller should be passed several times over the ground.

Lawns showing bare patches will require a dressing during the autumn, and the mixture previously mentioned will be found very suitable, and will keep the grass well nourished. Wood ashes and soot, combined or not, will also be found beneficial. All dressings should be applied during showery weather. If soil poverty is the cause of a patchy lawn, it is best to rake over in the autumn with a sharp-toothed rake, and dress with a good layer of fine soil and wood ashes.

FLOWER GARDEN.

Winter work ought to be in an advanced state. The roses will not want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, cockcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, paneratum, ismene, erinums, belladonna lily, and other bulbs. Put away dahlia roots in some warm moist spot, where they will start gently and be ready for planting out in August and September.

Farm Notes for July.

FIELD.—Practically the whole of the work on the land for this month will be confined to the cultivation of winter crops, which should be now making good growth, and to the preparation of land for the large variety of crops which can be sown next month. Early-maturing varieties of wheat may be sown this month. The harvesting of late-sown maize will be nearing completion, and all old stalks should be ploughed in and allowed to rot. Clean up all headlands of weeds and rubbish, and for this purpose nothing equals a good fire. Mangels, swedes, and other root crops should be now well away, and should be ready for thinning out. Frosts, which can be expected almost for a certainty this month, will do much towards ridding the land of insect pests and checking weed growth. Cotton-picking should be now practically finished and the land under preparation for the next crop. The young lucerne should be becoming well established; the first cutting should be made before the plants flower—in fact, as soon as they are strong enough to stand the mowing machine—and the cutting of subsequent crops should be as frequent as the growth and development of the lucerne plants permit. Ordinarily cutting should be regulated to fit in with the early flowering period—i.e., when about one-third of the plants in the crop are in flower.

Orchard Notes for July.

THE COASTAL DISTRICTS.

The marketing of citrus fruits will continue to occupy the attention of growers. The same care in the handling, grading, and packing of the fruit that has been so strongly insisted upon in these monthly notes must be continued if satisfactory returns are to be expected. Despite the advice that has been given over and over again, some growers still fail to grasp the importance of placing their fruit on the market in the best possible condition, and persist in marketing it ungraded; good, blemished, and inferior fruit being met with in the same case. This, to say the least, is very bad business, and as some growers will not take the necessary trouble to grade and pack properly, there is only one thing to do, and that is to insist on the observance of standards of quality and see that the fruit offered for sale complies with the standards prescribed, and that cases are marked accordingly.

Where the crop has been gathered, the trees may be given such winter pruning as may be necessary, such as the removal of broken or diseased limbs or branches, and the pruning of any superfluous wood from the centre of the tree. Where gumming of any kind is seen it should be at once attended to. If at the collar of the tree and attacking the main roots, the earth should be removed from around the trunk and main roots—all diseased wood, bark, and roots should be cut away, and the whole of the exposed parts painted with Bordeaux paste.

When treated do not fill in the soil around the main roots, but allow them to be exposed to the air for some time, as this tends to check any further gumming. When the gum is on the trunk or main limbs of the tree cut away all diseased bark and wood till a healthy growth is met with, and cover the wounds with Bordeaux paste.

If the main limbs are infested with scale insects or attacked by any kind of moss, lichen, or fungus growth, they should be sprayed with lime sulphur.

Towards the end of the month all young trees should be carefully examined for the presence of elephant beetles, which, in addition to eating the leaves and young bark, lay their eggs in the fork of the tree. When the young hatch out they eat their way through to the wood and then work between the wood and the bark, eventually ringbarking one or more of the main limbs, or even the trunk. A dressing of strong lime sulphur to the trunk and fork of the tree, if applied before the beetles lay their eggs, will act as a preventive. In the warmer localities a careful watch should also be kept for the first appearance of any sucking bugs, and to destroy any that may be found. If this is done systematically by all growers the damage done by this pest will be very much reduced.

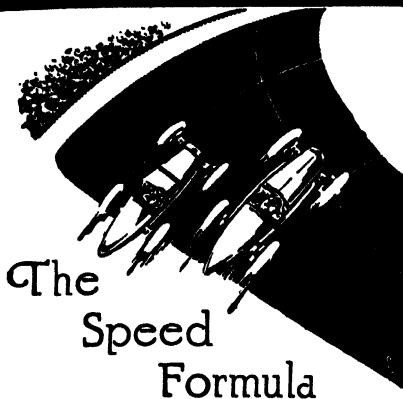
Citrus trees may be planted throughout the month. Take care to see that the work is done in accordance with the instructions given in the June notes. All worn-out trees should be taken out, provided the root system is too far gone to be renovated, but when the root system is still good the top of the tree should be removed till sound, healthy wood is met with, and the portion left should be painted with a strong solution of lime sulphur. If this is done the tree will make a clean, healthy growth in spring.

The inclusion of a wide range of varieties in citrus orchards—and which has been the general practice—is to be deprecated. Even in new plantations there is a tendency to follow the same unprofitable lines. Far too much consideration is given to the vendor's description or the purchaser's appreciation of a particular variety or varieties. Individual tastes must be subordinated to market requirements, and the selection of varieties to the best available kind of early, medium, and late fruits. Amongst oranges Joppa should be placed first, Sabina for early fruit, and Valencia or Loon Giru Gong for late markets.

In mandarins local conditions influence several varieties, and since the introduction of the fungus known as "scab" the inclusion, particularly on volcanic soil, of the Glen Retreat and Emperor types is risky. In alluvial lands, Emperor and Sovereign (an improved Glen Retreat) are the most profitable, though Scarlet in many places is worth including, with King of Siam as a late fruit.

Land intended for bananas and pineapples may be got ready, and existing plantations should be kept in a well-cultivated condition so as to retain moisture in the soil.

Bananas intended for Southern markets may be allowed to become fully developed, but not coloured, as they carry well during the colder months of the year, unless they meet with a very cold spell when passing through the New England district of New South Wales.



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Penelope—Dark crimson
Radiance—Carmine
Red Radiance—Bright red
Snow Queen—Snow white
Star of Queensland—Velvety crimson
Sunburst—Orange yellow
White Maman Cochet—White.

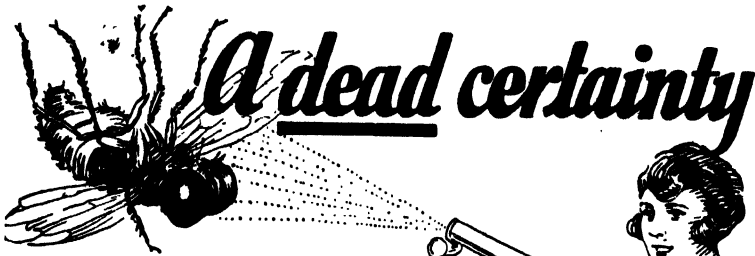
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The winter crop of smoothleaf pines will commence to ripen towards the end of the month, and when free from blackheart (the result of a cold winter) or from fruitlet core rot, they are good for canning, as they are of firm texture and stand handling. Where there is any danger of frost or even of cold winds, it pays to cover pines and also the bunches of bananas. Bush hay is used for the former and sacking for the latter.

Strawberries should be plentiful during the month, provided the weather is suitable to their development, but if there is an insufficient rainfall, then irrigation is required to produce a crop. Strawberries, like all other fruits, pay well for careful handling, grading, and packing; well-packed boxes always realising a much higher price than indifferently packed ones on the local market. Where strawberries show signs of leaf blight or mildew, spray with Bordeaux mixture for the former and with sulphide of soda for the latter.

When custard apples fail to ripen when gathered, try the effect of placing them in the banana-ripening rooms, and they will soon soften instead of turning black.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

July is a busy month for the growers of deciduous fruits, as the important work of winter pruning should, if possible, be completed before the end of the month, so as to give plenty of time for spraying and getting the orchard into proper trim before the spring growth starts.

In pruning, follow the advice given in the May number; and if you are not thoroughly conversant with the work, get the advice of one of the Departmental officers stationed in the district.

Pruning is one of the most important orchard operations, as the following and succeeding seasons' crops depend very largely on the manner in which it is carried out. It regulates the growth as well as the number and size of the fruit, as if too much bearing wood is left, there is a chance of the tree setting many more fruits than it can properly mature, with a result that unless it is rigorously thinned out it is undersized and unsaleable. On the other hand, it is not advisable to unduly reduce the quantity of bearing wood, or a small crop of overgrown fruit may be the result.

Apples, pears, and European varieties of plums produce their fruits on spurs that are formed on wood of two-years' growth or more; apricots and Japanese plums on new growth and on spurs; but peaches and nectarines always on wood of the previous season's growth. Once peachwood has fruited it will not produce any more from the same season's wood, though it may develop spurs having a new growth or new laterals which will produce fruit.

The pruning of the peaches and nectarines, therefore, necessitates the leaving of sufficient new wood on the tree each season to carry a full crop, as well as the leaving of buds from which to grow new wood for the succeeding year's crop. In other words, one not only prunes for the immediately succeeding crop, but also for that of the following season.

All prunings should be gathered and burnt, as any disease that may be on the wood is thoroughly destroyed. When pruned, the trees are ready for their winter spraying with lime-sulphur.

All kinds of deciduous trees may be planted during the month provided the ground is in a proper state to plant them. If not, it is better to delay planting until August, and carry out the necessary work in the interval. The preparation of new land for planting may be continued, although it is somewhat late in the season, as new land is always the better for being given a chance to mellow and sweeten before being planted. Do not prune vines yet on the Granite Belt; they can, however, be pruned on the Downs and in the western districts.

Trees of all kinds, including citrus, can also be planted in suitable situations on the Downs and western districts, and the pruning of deciduous trees should be concluded there. If the winter has been very dry, and the soil is badly in need of moisture, all orchards in the western districts, after being pruned and ploughed, should receive a thorough irrigation (where water is available) about the end of the month, so as to provide moisture for the use of the trees when they start growth. Irrigation should be followed by a thorough cultivation of the land to conserve the water so applied. As frequently mentioned in these notes, irrigation and cultivation must go hand in hand if the best results are to be obtained, especially in our hot and dry districts.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.**AT WARWICK.****MOONRISE.**

| Data. | June, 1929. | | July, 1929. | | June, 1929. | | July 1929. | |
|-------|-------------|-------|-------------|-------|-------------|-------|------------|-------|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 6.39 | 5.0 | 6.47 | 5.5 | a.m. | | a.m. | |
| 2 | 6.39 | 5.0 | 6.47 | 5.5 | ... | | 12.18 | |
| 3 | 6.40 | 5.0 | 6.47 | 5.5 | 1.31 | | 2.22 | |
| 4 | 6.40 | 5.0 | 6.47 | 5.6 | 2.31 | | 3.30 | |
| 5 | 6.41 | 5.0 | 6.47 | 5.6 | 3.34 | | 4.39 | |
| 6 | 6.41 | 5.0 | 6.47 | 5.6 | 4.42 | | 5.49 | |
| 7 | 6.42 | 5.0 | 6.47 | 5.7 | 5.54 | | 6.58 | |
| 8 | 6.42 | 5.0 | 6.47 | 5.7 | 7.5 | | 8.0 | |
| 9 | 6.42 | 5.0 | 6.46 | 5.7 | 8.14 | | 8.51 | |
| 10 | 6.42 | 5.0 | 6.46 | 5.8 | 9.18 | | 9.35 | |
| 11 | 6.42 | 5.0 | 6.46 | 5.8 | 10.14 | | 10.12 | |
| 12 | 6.43 | 5.0 | 6.46 | 5.8 | 11.1 | | 10.58 | |
| 13 | 6.43 | 5.0 | 6.46 | 5.9 | 11.39 | | 11.17 | |
| 14 | 6.43 | 5.0 | 6.46 | 5.9 | p.m. | | | |
| | | | | | 12.13 | | 11.47 | |
| 15 | 6.43 | 5.0 | 6.46 | 5.9 | 12.44 | | 12.18 | |
| 16 | 6.44 | 5.0 | 6.46 | 5.10 | 1.15 | | 12.51 | |
| 17 | 6.44 | 5.0 | 6.45 | 5.10 | 1.44 | | 1.27 | |
| 18 | 6.44 | 5.1 | 6.45 | 5.11 | 2.15 | | 2.7 | |
| 19 | 6.45 | 5.1 | 6.44 | 5.11 | 2.51 | | 2.54 | |
| 20 | 6.45 | 5.1 | 6.44 | 5.12 | 3.27 | | 3.44 | |
| 21 | 6.45 | 5.1 | 6.43 | 5.12 | 4.10 | | 4.37 | |
| 22 | 6.45 | 5.2 | 6.43 | 5.13 | 4.57 | | 5.31 | |
| 23 | 6.46 | 5.2 | 6.42 | 5.13 | 5.49 | | 6.27 | |
| 24 | 6.46 | 5.2 | 6.42 | 5.14 | 6.42 | | 7.25 | |
| 25 | 6.46 | 5.3 | 6.41 | 5.14 | 7.36 | | 8.18 | |
| 26 | 6.46 | 5.3 | 6.41 | 5.15 | 8.33 | | 9.15 | |
| 27 | 6.46 | 5.3 | 6.40 | 5.15 | 9.28 | | 10.11 | |
| 28 | 6.46 | 5.4 | 6.40 | 5.16 | 10.24 | | 11.10 | |
| 29 | 6.46 | 5.4 | 6.39 | 5.16 | 11.20 | | ... | |
| | | | | | a.m. | | a.m. | |
| 30 | 6.46 | 5.4 | 6.39 | 5.17 | 12.18 | | 12.9 | |
| 31 | | | 6.38 | 5.18 | y | | 1.14 | |

Phases of the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

| | | |
|--------|-----------------|------------|
| 7 June | ● New Moon | 11 56 p.m. |
| 14 " | (First Quarter | 3 14 p.m. |
| 22 " | ○ Full Moon | 2 15 p.m. |
| 30 " |) Last Quarter | 1 53 p.m. |

Perigee, 8th June, at 1.30 p.m.

Apogee, 22nd June, at 10.54 p.m.

The occultation of Jupiter by the Moon about 5 hours after sunset will be invisible.

The planet Neptune, which has appeared to be remarkably close to Regulus, the brightest star in Leo, for some months past, will appear to be still closer on the 6th. The apparent distance between the planet and the star will very gradually increase after that date. On the 12th the Moon will pass 5 degrees below the planet and Regulus at 6 p.m., and, being still young, will permit the bright star to be noticed, thus forming a good indicator of that notable star's position.

The conjunction with the Moon of Jupiter on the 6th, and of Mercury on the 7th will be invisible on account of their apparent nearness to the Sun. Mercury will pass about 3 degrees above the Sun from east to west on the 9th. Saturn will be in opposition to the Sun on the 18th, that is, it will rise as the Sun sets and set when the Sun rises.

The Australian winter solstice will occur on the 22nd when the Sun will reach its greatest northern latitude, the Tropic of Cancer, after which it will again slowly return southward.

Venus will be at its greatest elongation, 46 degrees west, on the 22nd. It will then be halfway between the eastern horizon and the zenith at the time of sunrise.

The principal constellations visible in June will be Leo, Virgo, Libra, Scorpio, and Sagittarius. Orion will set with the Sun on the 15th, while Scorpio will be hanging over the eastern horizon in double S-like curves, and at 11 p.m. will be immediately overhead at Brisbane, Toowoomba, and Warwick.

The Southern Cross on the 15th will be upright at 7 p.m., and in a horizontal position at 1 a.m., when it will be at its greatest distance (30 degrees) west of the south celestial pole.

| | | |
|--------|-----------------|------------|
| 7 July | ● New Moon | 6 47 a.m. |
| 14 " | (First Quarter | 2 5 a.m. |
| 22 " | ○ Full Moon | 5 20 p.m. |
| 29 " |) Last Quarter | 10 55 a.m. |

Perigee, 6th July, at 11.0 p.m.

Apogee, 20th July, at 2.24 a.m.

Mercury, on the 3rd, is a morning star, apparently amongst those of Taurus, rising an hour and 49 minutes before the Sun, the nearest stars of any magnitude being Beta Tauri to the north-east and Aldebaran about the same distance to the west.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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